Pests

AND THEIR CONTROL

1942
AUGUST
VOL. 10 NO. 8

ORGAN OF THE PEST CONTROL INDUSTRY

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Fumigators
Termite Control Operators
Entomologists
Insecticide and Supply Mfgrs.

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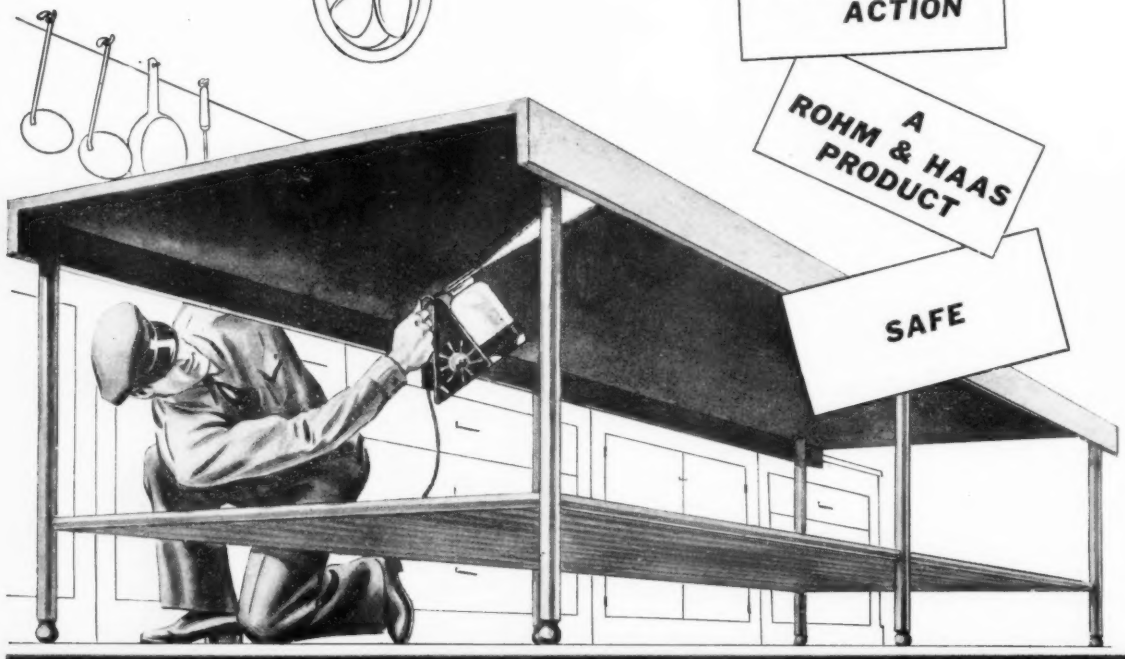

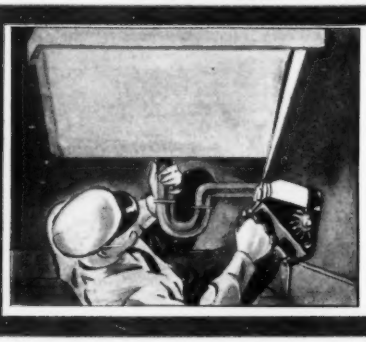

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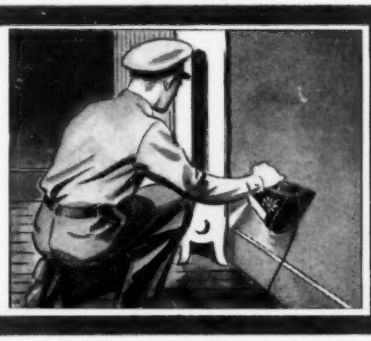

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Pests

and Their CONTROL

COOPERATING WITH NATIONAL PEST CONTROL ASSOCIATION

Exterminators, Fumigators, Termite Control Operators, Entomologists, Insecticide and Supply Manufacturers

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STATEMENT

The National Association appreciates the co-operation given by way of publicity. The Association is not responsible for articles published unless credited to the Association. The list of officers and directors is published for informational purposes only.

For further details, communicate with

WILLIAM O. BUETTNER, *Secretary*
3019 Fort Hamilton Parkway — Brooklyn, New York

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EDITORIAL

Public Shrewd "Taskmaster"

THIS CAN HAPPEN to you; maybe it has already. The 'phone rings, you pick up the receiver, the speaker says he has seen your ad in the classified telephone directory, has what appears to be a termite problem, and would like to consult you. You're a busy man, so you assign one of your assistants, who grabs his hat, jumps in the old bus, and "hotfoots" it out to the address given. There, he is met by the owner who lets loose a barrage of leading questions anent termites, methods of control, etc.; and your assistant being a good fellow and an optimist—e'en as you—he dispenses freely and easily of the knowledge he has acquired the hard way. Likely as not, he arranges to throw in free, a time-consuming, expense incurring termite inspection—with more questions to be answered after its completion—in the hopes, of course, of landing the job. But, though your assistant doesn't know it at the time, he was "spurlos versenkt" even before he grabbed for his fedora; for all the prospective client?? ever really wanted was to get information which would help him to become his own termite control operator, if he could.

And, as your assistant returns to his car, and is about to step on the gas, he sees out of the corner of his eye, your friendly competitor who has just pulled up to the same place for a similar "once over."

Another day. Another 'phone call. This time its from one of the title and mortgage company's vice-presidents. He wishes to see you about making a termite inspection of one of their buildings. Your calendar is well filled; but the prospect and the prospects please you, so you push some other matters aside and arrange to see him the next A. M. This is the "real McCoy," you say to yourself, no assistant this time. Meanwhile, you get that haircut you've put off getting the last three days because you've been so busy. You turn up at the appointed hour in the marbled sanctum sanctorum of the respectable title and mortgage company looking your Sunday-best, plus a brief case full of testimonials and other pertinent data.

There in the privacy of his office, Mr. Vice-President explains once again that he is interested in having you make a termite inspection of one of their properties. But, and here's the rub, he stresses the importance of submitting your findings, as to whether or not there is termite infestation, in writing; which report because it is on the letterhead of a responsible PCO becomes a document of inestimable value to the company in the supervision of the property. Now where do you come out on all this? If there are no termites found, you are not paid for the inspection; if there are, you still do not get paid, except perhaps, by way of an opportunity to bid on any subsequent control job let. Looks to us like a case of "heads" they win; "tails" you lose.

It is patent there are some types of accounts most PCOs can profitably do without. Moreover, unless, and until, the PCO wakes up to the fact that he is being made the butt end of a racket and rebuts it with an adequate charge for all services and inspections, and clamps down on giving away professional trade secrets, he, like the fellow who signs a "waiver of immunity," will find that the questions he answers, the reports he submits, to Mr. John Q. Public and to Mr. Vice-President, will be later used by them against his own better economic interest.

Termite Inspection Aftermath

IN line with the thought that there is much instruction in the other fellow's experience, and on the basis of facts made known by a West Coast termite control operator, we here detail a case history of a paid termite inspection report, and aftermath in which it was involved.

The said operator was called in to make a termite inspection for which report he was paid his usual fee. So far so good. But, a few days later, to his chagrin, he learned that the property owner had hired a five-dollar-a-day, jack-knife carpenter to make the repairs as outlined in the inspection report.

It is apparent that even the operator with a policy of paid termite inspections will not find it completely abuse-proof; but, in contradistinction to the free inspection termite operator, he, at least, has received a "consolation" fee for his time and knowledge. And, as for the property owner, it will be a case of poetic justice overtaking him when he discovers, as he assuredly will, that being penny wise and pound foolish is no way to do an effective job of termite control.

You Can Help Prevent This—

WITH so many employee-exterminators now serving Uncle Sam and easy identification, of the many new employees by tenants in properties serviced, difficult, one might have almost predicted the unfortunate occurrence reported recently in a mid-western newspaper, wherein a gunman gained entrance to a woman's apartment on the pretext that he was an exterminator, pointed a gun at her baby, and demanded that she turn over to him the $400 diamond ring she was wearing, which, needless to say, she did.

Many pest control firms, of course, have in operation efficient systems for identification of bona-fide employees; but for those who haven't, the circumstance suggests that some method be devised to help minimize its reoccurrence. To do so is only good business, aside from other considerations, since the mud thrown by such news items, as is also true in the case of a fumigation accident, is bound to splatter the industry no matter how blameless it may be.

"Positively—Yes!!"

A NOT entirely unexpected question has arisen in some quarters as to whether the Annual N.P.C.A. October Convention at Pittsburgh would, or should, be held. To others similarly puzzled, we are assured by the Secretary's office, the answer is "POSITIVELY—YES!", barring, of course, an extremely improbable governmental ukase to the contrary. Meanwhile preparations for a program befitting the times are now under full-throttle.

Present-day conditions affecting the Industry being what they are; the foreseeable future even more so; and the need to make plans to exploit the maximum potential of the Industry in furthering the war effort—all these reflect and reaffirm the urgency of convening as scheduled, with convention participation—in the fullest meaning of the word—on the part of the PCO, not only serving a patriotic purpose but the better part of economic wisdom. In short, your enlistment for the convention duration is, in effect, "practically compulsory."

The William Penn Hotel, Pittsburgh, Pa., will be the headquarters October 26-27-28. Plan to attend if you want first hand information.

W. O. Buettner Invited to Serve as Member Household and Industrial Insecticide Manufacturers' Advisory Committee, War Production Board

FOR the recognition it implies, and for the representation it affords, the text of the telegram, directly quoted, is a feather in the collective cap of the Industry:

WESTERN UNION

William O. Buettner, Buettner Pest Control Co.
3019 Fort Hamilton Parkway, Bklyn., N. Y.

AT THE REQUEST OF W. H. MOYER, GOVERNMENT PRESIDING OFFICER, YOU ARE INVITED TO SERVE AS MEMBER OF THE HOUSEHOLD AND INDUSTRIAL INSECTICIDES MANUFACTURERS INDUSTRY ADVISORY COMMITTEE WAR PRODUCTION BOARD AND ATTEND FIRST MEETING TO BE HELD JULY 21, 9:30 A.M., ROOM 3424, SOCIAL SECURITY BUILDING, WASHINGTON, TO CONSIDER PROBLEMS OUTLINED IN AGENDA BEING FORWARDED AIRMAIL. PLEASE ADVISE ME BY WIRE WHETHER YOU ACCEPT MEMBERSHIP AND WHETHER OR NOT YOU CAN ATTEND MEETING. THIS TELEGRAM WILL SERVE AS IDENTIFICATION.

T. SPENCER SHORE, CHIEF, BUREAU OF INDUSTRY COMMITTEES, WAR PRODUCTION BOARD.

That the composition of the committee's membership is to be of a very high order, is evidenced by the invitation extended, and accepted, of course, by Mr. Buettner. That much of constructive interest for the P.C.I. should result, there's no gainsaying. Congratulations to all concerned are in order!

Pyrethrum Frozen

TRY as we might, it just was not possible, due to press-time commitments, to include in our July issue, the important news-break relative to the War Production Board's General Preference Order, M-179, freezing pyrethrum, which has been in effect since June 13, 1942.

However, those who were fortunate enough to hold membership in the N.P.C.A. at the time, received their Service Letter No. 251*, which discussed the ramifications and significance of the order, plus advice apropos obtaining pyrethrum supplies, if and when they are made available. It is expected that further details will be forthcoming as several meetings take place in Washington to discuss this problem as the freezing affects the PCO and his ability to remain in business.

Of complementary interest is "Soap's" digest of M-179: "The order applies only to processors of pyrethrum, who, in terms stripped of legal verbiage, are the half dozen manufacturers of pyrethrum extracts. They are instructed to send to Washington the 10th of each month a list of the orders for pyrethrum which they have for the following month. Qualified uses are for the Army and Navy, Agricultural purposes and for public health applications. No shipments are to be made by the processors until specific approval has been given to the order by the Government."

**A few copies of Service Letter No. 251 are still available. Copies will be sent, as long as the supply lasts, to non-members of the Association, if they will address their request to W. O. Buettner, N.P.C.A., 3019 Ft. Hamilton Parkway, Brooklyn, N. Y.—Ed.*

Buy War Bonds and Stamps

Legislation Relating to Rodents

By ERNEST M. MILLS, *U. S. Fish and Wildlife Service, New Brunswick, N. J.*

BECAUSE so many inquiries have been received as to existing legislation pertaining to rodents, more particularly rats and house mice, this summary will in part meet these requests. This article should be viewed only as a partial compilation touching on the highlights of the laws or ordinances which directly or indirectly apply to the rodent problem. No efforts are made to interpret or enlarge upon these law excerpts, but the mere citation of them may form the basis for further study culminating in uniform, common sense, and publicly supported laws.

Laws in general divide themselves into Federal, State, and municipal jurisdictions. Such will be the approach to this subject except that all references to rat-proofing and general citations will be covered under separate headings.

Basic laws and statutes may be considered as the fundamental power by which Federal, State, and municipal agencies exercise supervision and control. Such basic laws usually are supplemented by rules and regulations which have the force of being a part of the said basic laws or statutes.

Federal

The national welfare of our people rests with the Congress which protects and guarantees human rights and privileges, the scope of which becomes an all inclusive policy that considers the Nation as a whole. Thus, Acts of Congress have been enacted to cover international and interstate relationships. Laws regulating the inspection and fumigation of vessels, supervision of certain food manufacturing, meat packing and other establishments, illustrate this national policy and likewise embody specific responsibilities. Also, this Federal legislation authorizes nation-wide research and investigation, followed by advisory and educational services.

Among examples of federal legislation are the following quoted sections:

1—**United States Public Health Service:** An act granting additional quarantine powers and imposing additional duties upon the Marine-Hospital Service. (Act Feb. 15, 1893, ch. 114, 27 Stat. L 449.)

Sec. 3. "That the Supervising Surgeon General of the Marine-Hospital Service shall, immediately after this act takes effect, examine the quarantine regulations of all State and municipal boards of health, and shall, under the direction of the Secretary of the Treasury, cooperate with and aid State and municipal boards of health in the execution and enforcement of the rules and regulations made by the Secretary of the Treasury to prevent the introduction of contagious or infectious diseases into the United States from foreign countries, and into one State or Territory or the District of Columbia from another State or Territory or the District of Columbia; and all rules and regulations made by the Secretary of the Treasury shall operate uniformly and in no manner discriminate against any port or place; and at such ports and places within the United States as have no quarantine regulations under State or municipal authority, where such regulations are, in the opinion of the Secretary of the Treasury, necessary to prevent the introduction of contagious or infectious diseases into the United States from foreign countries . . .

"The Secretary of the Treasury shall make such rules and regulations as are necessary to be observed by vessels at the port of departure and on the voyage, when such vessels sail from any foreign port or place to any port or place in the United States, to secure the best sanitary conditions of such vessel, her cargo, passengers, and crew; which shall be published and communicated to and enforced by the consular officers of the United States."

Sec. 5. " . . .; and it shall not be lawful for any vessel to enter said port to discharge its cargo, or land its passengers, except upon the certificate of the health officer at such quarantine station certifying that said rules and regulations have in all respects been observed and complied with, as well as on his part as on the part of the said vessel and its master, in respect to the same and to its cargo, passengers, and crew; . . ."

An act to further protect public health and make more effective the national quarantine. (Act June 19, 1906, ch. 3433, 34 Stat. L. 299.)

Sec. 7. ". . . for the purpose of carrying into effect the provisions of this act, as well as for the purpose generally of preventing the importation of yellow fever and other quarantinable diseases into the United States, and for the further purposes, in cooperation with State or municipal health authorities, or eradicating them should they be imported, or preventing their spread from one State into another State, and of destroying their causes."

References. Regulations for the government of the U. S. Public Health Service. Approved June 18, 1931, effective July 1, 1931.

Code of Federal Regulations, Title 42—Public Health. 1940.

2—**Fish and Wildlife Service, U. S. Department of Interior:** "The legal sanction for control work by the Federal Government is contained in a congressional direction in annual appropriation acts for the Department of Agriculture, and since July 1, 1939, for the Department of the Interior, and a special enactment authorizing a definite control program. The appropriation acts making funds available for the use of the Bureau of Biological Survey (which on June 30, 1940, became the Fish and Wildlife Service) since the year 1915 have provided for investigations, experiments, demonstrations, and cooperation for the control of wild animals injurious to agriculture, horticulture, forestry, animal husbandry, and wild game, and for the suppression of rabies in predatory wild animals. The special program of control, which was called for by the Seventieth Congress, was drawn up by the Department of Agriculture and was authorized by act of the Seventy-first Congress, approved on March 2, 1931."

3—**Federal Food, Drug, and Cosmetic Act:** The U. S. Federal Security Agency has authority under an Act, Public, Seventy-fifth Congress, Chapter 675, Third Session, S. 5 to prohibit the sale of interstate food which is adulterated or prepared under insanitary conditions. The significant parts of the applicable sections follow:

Sec. 301. "The following acts and the causing thereof are hereby prohibited: (c) The receipt in interstate commerce of any food, drug, device, or cosmetic that is adulterated or misbranded, and for the delivery or proferred delivery thereof for pay or otherwise. Sec. 402. A food shall be deemed to be adulterated—(a) (3) if it consists in whole or in part of any filthy, putrid, or decomposed substance, or if it is otherwise unfit for food; or (4) if it has been prepared, packed, or held under insanitary conditions whereby it may have become contaminated with filth, or whereby it may have been rendered injurious to health; . . ."

4—**Regulation of U. S. Bureau of Animal Industry:** "Federally inspected meat packing establishments are required, under the meat inspection regulations of the Department of Agriculture, to take all practicable precautions against infestation with rats, mice, and other vermin. In respect to rats, the most important of these are rat-proof construction in all new buildings and systematic rat proofing of older buildings, together with strict sanitation and avoidance of any conditions, such as accumulations of rubbish, which might afford harborage. Fumigation with hydrocyanic acid gas is frequently employed under appropriate precautions. Resort is also had to trapping. Use of two bait poisons, namely, barium carbonate and red squill, is permitted under appropriate restrictions intended to prevent possible contamination of meat or product. The more important of these are: that the baits shall be placed under the supervision of an inspector; that they shall be of such character and so protected as not to be broken up or scattered about; that strict account shall be kept of the number and location of all baits set out; that the baits shall not be set in edible products departments until after operations have ended for the day; that all uneaten baits shall be gathered up and destroyed before operations are resumed; and that the entire supply of the poisons and poison baits shall be kept

under strict supervision in a place designated by the inspector in charge." (Letter of March 13, 1941, E. C. Joss.)

State

The several states grant powers via Health Laws and Sanitary Codes which seldom refer to rats and mice but the phraseology is interpreted to include rodents. Possibly "Nuisances" would be the inclusive term which encompasses all aspects or phases of insect and rodent problems.

Quoting a few excerpts of various state laws:

1—New Jersey Sanitary Code, Chapter 1, Regulation 1.—"Nuisances hazardous to human health. No person or private or municipal corporation shall maintain or permit to be maintained anything which is a hazard or a danger to human health."

2—Montana, Section 2454, Regulation 96. —"Nuisances. Local and county health officers are charged with responsibility of ordering the abatement or removal of all nuisances detrimental to the public health and shall make prompt investigation of all complaints as to such. All orders for abatement or removal of such shall be written and made in triplicate, one to be delivered to the occupant of the premises on which the nuisance exists, one to be forwarded to the State Board of Health and one to be retained by the health officer. The occupant of the premises shall be held responsible for the abatement of the nuisance. In the discretion of the health officer a reasonable length of time shall be given for the abatement or removal of the nuisance and if not abated or removed within the period prescribed it is the duty of the health officer to require the removal in the manner prescribed by law. For the guidance of health officers the following definitions are offered: . . . see pamphlet."

3—New York Sanitary Code, Chapter VII. —"Nuisances which may affect life and health. Regulation 1. All complaints to be investigated. The local health officer, upon receiving a complaint of the existence within his jurisdiction of a nuisance which may affect health, or when the probable existence of any such nuisance comes to his attention, shall make or cause to be made by his duly authorized representative an immediate and thorough investigation, and if, in his opinion, such a nuisance exists, he shall take steps to secure its voluntary abatement." (There then follows a series of regulations 2-7.)

4—California Sanitary Code.—Section 370 —"Anything which is injurious to health, or is indecent, or offensive to the senses, or an obstruction to the free use of property, so as to interfere with the comfortable enjoyment of life or property by an entire community or neighborhood, or by any considerable number of persons, or unlawfully obstructs the free passage or use, in the customary manner, or any navigable lake, or river, bay, stream, canal, or basin, or any public park, square, street, or highway, is a public nuisance.

Section 372. "Every person who maintains or commits any public nuisance, the punishment for which is not otherwise prescribed, or who wilfully omits to perform any legal duty relating to the removal of a public nuisance, is guilty of a misdemeanor."

Section 377a. "Every person who maintains, permits, or allows a public nuisance to exist upon his or her property or premises, and every person occupying or leasing the property or premises of another who maintains, permits, or allows a public nuisance to exist thereon, after reasonable notice in writing from a health officer or district attorney to remove, discontinue or abate the same has been served upon such person, is guilty of a misdemeanor, and shall be punished accordingly; and the existence of such nuisance for each and every day after the service of such notice shall be deemed a separate and distinct offense, and it is hereby made the duty of the district attorney to prosecute all persons guilty of violating this section by continuous prosecutions until the nuisance is abated and removed."

5—South Carolina Sanitary Code, Section 1. — "Whatever is dangerous to human health, whatever renders the ground, air or food a hazard or injury to human health, and the following acts, conditions and things, are, each and all of them, hereby declared to constitute a nuisance:

(f) The keeping of any building, or any part of a building, which, on account of its dilapidated condition or its occupancy by any person afflicted with a communicable disease, or by filthy tenants, may endanger the life or health of residents therein or in the vicinity thereof."

6—Connecticut Sanitary Code, Regulation 101.—"The following conditions are specifically declared to constitute public nuisances:

(a) Bakeries, restaurants and other places where food is prepared or served that are not kept in a clean and sanitary condition; ——— or in which there is evidence that rats, mice or vermin are present."

7—Arkansas gives reg. 166 as follows: "Every hotel, boarding house, or lodging house shall have the premises well drained, and shall be kept at all times in a clean and sanitary condition, free from vermin, . . . " North Carolina's rules for the sanitary management of hotels and cafes states, "The dining room shall be kept free from flies, roaches, rats, and mice, and other vermin at all times." West Virginia Public Health Laws read: (Section 6—Hotels) "In every hotel, any room infected with vermin or bed bugs shall be fumigated, disinfected and renovated until said vermin or bed bugs are extirpated."

8—Kentucky Hotels and Restaurants, Sections 9 and 11.—"Food Protection. Raw and prepared food shall be protected from contamination by dust, flies, persons, vermin and unnecessary contact. This shall mean in connection with all ice cream cans or containers that they shall be kept properly covered when not in use. All dippers used for dipping ice cream shall be properly sterilized after use." Vermin—"There shall be entire freedom from vermin, that is, rats, mice, roaches, etc.

9—California in 1939 issued a mimeographed Bulletin No. 43 in which reference is made to the Statutes of 1909, page 311 entitled "Extermination of Rodents."

10—It appears that the Indiana Acts of 1913 follow closely California. The more pertinent sections of the Indiana Act, in force April 30, 1913, are:

8243. (7648j) "Rats, extermination, health officers, directions. 1.—It shall be unlawful for any person, firm, copartnership, company or corporation, owning, leasing, occupying, possessing or having charge of any land, place, building, structure, stacks or quantities of wood, hay, corn, wheat or other grains or materials, or any vessel or water-craft, to permit the same to become rat infested, and it shall be the duty of any such person, firm, copartnership, company, or corporation, upon any knowledge or notice, to at once proceed and to continue in good faith to endeavor to exterminate and destroy such rats by poisoning, trapping, and other appropriate means, such as may be suggested by the state board of health or the local health officers. And it shall be the duty of the trustees of the several townships and the boards of school trustees of the several cities and towns in the state to make provisions in the public schools under their jurisdiction for the illustrative teaching of the anatomy, physiology and hygiene of the human system; the effects of alcohol and nicotine, the cause, the course of consumption; the dissemination of diseases by rats, flies and mosquitoes and the effects thereof, and the prevention of diseases by the proper selection and consumption of food."

8244. (7648k) "Health officers, powers. 2. The State Board of Health and inspectors appointed by such board, and local health officers and inspectors appointed for the purpose, as hereinafter provided, shall have authority and shall be permitted to enter into and upon all lands, places, buildings, structures, vessel or water-craft for the purpose of ascertaining whether the same are infested with rats and whether the requirements of this act as to extermination and destruction thereof are being complied with; provided, that no building occupied as a dwelling, hotel or rooming house shall be entered for such purpose except between the hours of nine o'clock in the forenoon and five o'clock in the afternoon of any day."

8246. (7648m) "Expense of extermination, lien. 4. Whenever any person, firm, copartnership, company or corporation owning, leasing, occupying, possessing or having charge of any land, place, building, structure, stacks or quantities of wood, hay, corn, wheat or other infested grains or materials, or any vessel or water-craft which is infested with rats shall fail, neglect or refuse to proceed and continue to endeavor to exterminate and destroy such rats as herein required, it shall be the duty of the state board of health, or its inspectors, and the local health officer, or the local board of health, or its inspectors, at once to cause such nuisance to be abated by exterminating and destroying such rats.

The expense thereof shall be a charge against the county, town or city, which has, by its board or council, ordered such destruction or extermination of rats, and such board or council shall allow and pay the same.

When such destruction of rats is ordered by the town board or city council, the clerk of such town or city shall at once file with the county auditor a certified statement of the expense of such extermination and, in any such case, the county auditor shall charge the amount so expended for destroying rats as aforesaid against the property on which said nuisance shall have been abated, and the same shall be collected as other taxes are now collected, and when so collected, shall be paid to said county, town or city to reimburse it for the amount so paid out for the destruction of rats as aforesaid."

8248. (7648o) "Officers entering premises. 6. Any health officer or any inspector appointed under the provisions of this act shall have the right, without a warrant, to enter upon or into any land, place, building, structure or premises suspected of being rat infested for the discovery or destruction of rats, and any person or number of persons who shall obstruct him in the performance of his duties shall be guilty of a misdemeanor and, upon conviction, shall be fined in any sum not less than two (2) dollars nor more than ten (10) dollars."

8249. (7648p) Penalty. 7. "Any person, firm, copartnership, company, corporation, or school official, violating any of the provisions contained in section one of this act shall be guilty of a misdemeanor and, upon conviction, shall be fined in any sum not less than ten (10) dollars nor more than one hundred (100) dollars."

11—North Carolina. Laws and Regulations for the sanitary management of hotels and cafes. Page 10, Section 7: "The kitchen and pantry shall be kept free from flies, roaches, mice, and other vermin at all times."

12—Washington State Board of Health. Book V, part 1. Section 1. Definition of a Public or Common Nuisance. "For the purpose of these regulations, a public or common nuisance shall be considered as that which is set up, maintained or continued, so as to be injurious to the health, or an obstruction to the use of property by interfering with the repose, health, safety or life of any considerable number of persons."

CITY OR MUNICIPAL

It will be readily recognized that the phraseology in State Legislation is general in the sense that nuisances and sanitary codes cover more than rats and mice and include items such as smoke nuisances, unsanitary conditions, faulty plumbing, etc. Our Democracy looks to Congress for national guidance and establishment of policies for the Nation. State Legislatures similarly provide laws for general application within State boundaries.

The subdivisions of government such as counties, cities and municipalities may enact more specific laws and ordinances but such must conform with existing National and State laws. In short, cities and municipalities have more detailed rules and regulations.

We submit a few of the more detailed sections of city and municipal laws and ordinances together with regulations, but shall omit any references to rat-proofing, which will be taken up under a separate section:

1—Baltimore, Maryland: On March 6, 1941 there was approved an ordinance on the Hygiene of Housing which is a part of the Baltimore City Code, 8 new sections added to article 16.

We quote a part of these:

a) 156A. "Every dwelling and every part thereof shall be kept clean and free from any accumulation of dirt, filth, rubbish, garbage or similar matter, and shall be kept free from vermin or rodent infestation. All yards, lawns and courts shall be similarly kept clean and free from rodent infestation. It shall be the duty of each occupant of a dwelling unit to keep in a clean condition that portion of the property which he occupies or over which he has exclusive control. If the occupant shall fail to keep his portion of the property clean, the Commissioner of Health may send a written notice to the occupant to abate such nuisance within the time specified in said notice. Failure of the occupant to comply with such notice shall be deemed a violation of this ordinance and upon conviction the occupant shall be subject to the penalty or penalties herein provided."

b) 156D. "Before proceeding to execute such order, the Commissioner of Health shall post a notice on the front of the building, stating that since such order was not complied with within the time mentioned in said notice, the Commissioner of Health will proceed to execute the same at the expiration of an additional five days and charge the cost thereof to the owner of the premises. A copy of such notice shall be sent to the owner of the property, or his agent, if names and addresses, on diligent search, can be ascertained, and such notice shall be posted on said premises at least five days before the Commissioner of Health proceeds to incur expenses, unless the condition is of such a character requiring immediate action, in which case the time of the notice shall be such as, in the judgment of the Commissioner of Health, is reasonable and proper. The Commissioner of Health shall deliver a copy of said expenses to the Bureau of Liens, and the clerk in charge of said bureau shall record or file the same in a book or file open to public inspection."

c) 156H. "Any person violating any of the provisions of this ordinance, or any lawful order or regulation made and adopted by the Commissioner of Health in pursuance thereof, shall be guilty of a misdemeanor and shall be subject to a fine not exceeding $50.00 and each day's violation shall constitute a separate offense."

2—Lakewood, Ohio (A suburb of Cleveland.) During the early part of 1942, the following was enacted (we quote salient parts):

"Whereas, an emergency exists in that an increase in the number of mice and rats within the City of Lakewood is detrimental to the health, welfare and safety of the inhabitants of the City requiring the immediate elimination of conditions conducive thereto and, therefore, in order to provide for the immediate preservation of the public health, safety and welfare and the usual operation of a municipal department, now therefore,

Be It Ordained By the Council of The City of Lakewood, State of Ohio:

Section 1. That the following conditions are found and declared to be conducive to harboring mice and rats and are hereby declared to be a nuisance and prohibited.

Broken building tile in area ways or in the walls or foundations of garages. Building materials dumped or stored in or near garages. Rubbish dumped or kept on the premises. Garage foundations under which mice or rats have burrowed. Underground garbage containers around or under which mice or rats have burrowed. Portable play houses, dog houses, tool sheds and stored building materials resting directly on the ground surfaces or less than 8 inches above such surface. Garbage containers without water-tight bottoms and tight-fitting tops. Concrete or wooden garage floors so broken that mice or rats can burrow or have burrowed under them.

The owner or occupant of any premises on which any such condition exists, who fails or refused within five days after being notified thereof by an officer or employee of the Department of Public Safety to abate the same, shall be deemed guilty of a misdemeanor, and upon conviction thereof shall be fined in any sum which together with the costs of the prosecution does not exceed Fifty Dollars ($50.00). In addition, such nuisance may be abated by the proper officers or employees of the City in the manner now or hereafter provided by ordinance."

3—New York City: Section 183. "Nuisances; conditions dangerous or prejudicial to life or health; duties of persons responsible. It is hereby declared to be the duty of every owner, part owner, lessee, tenant, and occupant, of, or person interested in, any place, water, ground, room, stall, apartment, building, erection, vessel, vehicle, matter, and thing, in the City of New York, and of every person conducting or interested in business therein or thereat, and of every person who has undertaken to clean any place, ground, or street, in the said City, and of every person, public officer, and department, having charge of any ground, place, building, or erection, in the said City, to keep, place, and preserve the same and the sewerage, drainage, and ventilation thereof in such condition, and to conduct the same in such manner, that it shall not be a nuisance, or be dangerous or prejudicial to life or health. The term "building" as used in this section, includes a railway car, booth, tent, shop or other erection or enclosure."

Section 147 is frequently used when there is found any rat infestation. It reads: "Room, factory, stall, place and appurtenances to be kept in a cleanly and wholesome condition; food, drugs and drink to be clean

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and wholesome, and not poisoned, infected, or rendered unsafe; personal responsibility of owner, lessee, occupant, or person in charge. Every person being the owner, lessee, occupant, or in charge of any room, stall, factory, premises, or place where any food or drink intended for human consumption, or drugs intended for internal or external human use, shall keep such room, stall, factory, premises, or place and its appurtenances, in a cleanly and wholesome condition, and every person having charge, or interested or engaged, whether as principal or agent, in the care of or in respect to the custody or sale, or any food or drink intended for human consumption, or drugs intended for internal or external human use, shall put and preserve the same in a cleanly and wholesome condition, and shall not allow the same or any part thereof, to become poisoned, infected or rendered unsafe or unwholesome for human food or drink or for internal or external human use."

Section 149:—Regulation 3—"Restaurant to be kept free from flies, rats, mice and other vermin. Every practical precaution shall be taken to keep the restaurant free from flies, rats, mice and other vermin. All flour, cereals and similar foodstuffs shall be stored in glass, earthenware, metal or other rat-proof containers or receptacles and kept covered when not in use."

4—**Washington, D. C. — June 10, 1941:** "That the Police Regulations of the District of Columbia be, and the same are hereby, amended by including therein a new Article under the title of "RODENT CONTROL", to be known as Article XXXII and to read as follows:

Section 1. "The Health Officer of the District of Columbia is authorized to make or cause to be made inspections of existing buildings and other structures to determine the prevalence of rats, and, if necessary for the protection of the public health, he may order the following things to be done: first, the vent stoppage of any rat-infested building or other structure or part thereof; second, the removal from the premises of trash or refuse which may provide rat harborages; third, the protection of food and garbage from rats; fourth, the extermination of rats on the premises by baiting or trapping, or both."

Section 2. "Any person who shall refuse to permit or shall interfere with such inspections, or, any owner or occupant of a building or other structure who shall fail, within thirty days after the issuance thereof, to comply with an order issued under Section 1, shall be guilty of a violation of these regulations."

Section 3. "Any person violating any of the provisions of these regulations shall, on conviction thereof, be punished by a fine of not more than $50.00."

5—**Milwaukee, Wisconsin:** "An Ordinance —No. 14—File Number 74312.

Official Notice

Published by Authority of the Common Council of the City of Milwaukee.

Office of City Clerk, Milwaukee, May 26, 1942. An ordinance to create Sections 80-48, 80-49, 80-50, 80-51, 80-52 and 80-53 of the Milwaukee Code relating to the extermination of rats, the elimination of rat harborages and feeding places, and the rat-proofing of such places.

The Mayor and Common Council of the City of Milwaukee do ordain as follows:

Part 1. There are hereby created five new sections of the Milwaukee Code to read:

Section 80-48. Definitions. Owner or Manager: Whenever any person or persons shall be in actual possession of or have charge, care or control of any property within the city, as executor, administrator, trustee, guardian or agent, such person or persons shall be deemed and taken to the owner or owners of such property within the true intent and meaning of this ordinance, and shall be bound to comply with the provisions of this ordinance to the same extent as the owner, and notice to any such person of any order or decision of the Commissioner of Health shall be deemed and taken to be a good and sufficient notice, as if such person or persons were actually the owner or owners of such property, except that whenever an entire premises or building is occupied, as a place of business such as a store, factory, warehouse, rooming house, junk yard, lumber yard or any other business under a single management, the person, firm or corporation in charge of such business shall be considered the owner or manager.

A Rat-Proof Container shall be a container constructed of concrete or metal, or the container shall be lined with metal or other material that is impervious to rats, and openings into the container such as doors shall be tight fitting to prevent the entrance of rats.

Rat-Proofing shall consist of closing openings in building foundations and openings under and around doors, windows, vents, and other places, which could provide

(Continued on Page 26)

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FLUOREX V is poisonous to all insect life and must be handled with the same care and attention as Sodium Fluoride. It must be kept away from children, from eatables and domestic animals.

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The Control of Endemic Typhus Fever

By C. L. WILLIAMS, *Medical Director, U. S. Public Health Service*

WHEN the so-called endemic or murine typhus fever was first differentiated, it was considered to be a definite entity distinct from epidemic or louse-borne typhus. In recent years, however, the demarkation between the two has become quite indefinite and it may be that in time it will practically disappear. It appears that murine typhus, although ordinarily carried from rat to man by rat fleas and possibly other ecto-parasites, may also be transmitted from man to man by body lice and after repeated transfers of this nature may become greatly enhanced in virulence approaching the epidemic type. In some localities, such as Mexico, the typhus present apparently is transmitted by both methods and it seems not unreasonable to believe that in the United States louse transfer of typhus would occur were it not for the fact that in this country these insects have become relatively rare. The typhus that we see in the United States appears to be a rat disease transmitted occasionally to human beings, the usual vector being the rat flea **X.cheopis.**

This present conception of murine typhus fever naturally suggests rat eradication as the principal procedure for its control in this country. In areas where lice are a factor they, too, must be dealt with. There are, of course, other possibilities. There are some indications that animals other than rats may be susceptible, although the evidence in this country does not suggest that any of them are a factor of major importance in maintaining a reservoir of infection. One of these is the opossum which is known to be susceptible and has been tentatively implicated as the infection source in recent unpublished reports.

Some of the cases of typhus that we see present epidemiological inconsistencies as, for example, the occasional cases in the large seaport cities which commonly do not appear to be associated with rats and which Zinser claims are almost exclusively among immigrants from endemic centers in Europe, and in most cases recrudescences of old infections. Such instances emphasize, what most of us realize, that the full story of typhus and its related disorders is far from completed.

In the Western Hemisphere typhus has existed for many years. In North America for a long time it was thought to occur only in Mexico where it has been studied by many research workers, among them Ricketts, Goldberger and Anderson. It was the observations of the latter two that gave us the first indication that the disease was present in cities of the United States. In checking over the descriptions of Brill's disease they noted a similarity with typhus as they had seen it in Mexico and shortly were able to demonstrate by cross-immunity tests that Brill's disease and Mexican typhus were apparently identical. While this observation showed that typhus was endemic in a number of centers in the United States, it did not immediately suggest the presence of an animal reservoir. It was not until some years of further study failed to indicate any direct mode of transmission, that an intensive search was instituted for an animal host. In the course of this study, it was found that the disease was far more widespread than had been suspected. In the early 1920s cases were reported here and there, but it was not until the later 1920s that a general distribution through the Southeastern States, particularly in Southern Georgia and Alabama, and in Southeastern Texas, became evident.

As the number of cases observed increased, it became more and more clearly evident that body lice were not the agents of transmission. Since rats had been implicated as hosts for quite a number of human diseases, and since their ecto-parasites, particularly fleas, were known to be vectors of other diseases, it was not unnatural that this animal should be suspected. In 1931, Mooser, working in Mexico City, demonstrated the presence of typhus virus in the brains of Norway rats trapped in the city. Eollowing this, it was soon shown by many workers that rats were infected with typhus in many parts of the world. In 1931, Dyer demonstrated typhus virus in rat fleas collected from foci in Baltimore, Maryland, and in succeeding years demonstrated experimentally that several varieties of fleas, but particularly **X.cheopis** were capable of transmitting the infection from rat to rat and presumably from rat to man.

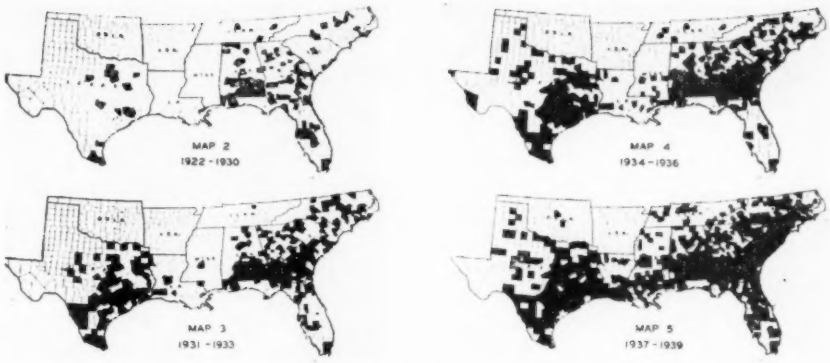
Maxcy advanced the suggestion that other ecto-parasites, particularly mites, and rat lice, were vectors, and this must still be considered as a possibility, in fact the principal rat louse has been demonstrated to be a vector between rats. From time to time articles appear submitting evidence that in some cases rat mites or lice were more likely to have been the vectors than rat fleas. The question is of some importance since, if ecto-parasites other than rat fleas play a part, it may be necessary in some localities to direct control measures against these insects, although it is still most probable that control of the rats themselves will automatically eliminate infected vectors.

Most of this preamble has been presented for the purpose of showing that there may be several factors to be considered in the control of murine typhus fever. As a practical matter, however, it is presently the opinion of those who have dealt with this disease that as with rat-borne bubonic plague, the only essential procedure is to control rats. So far as our experience with endemic typhus has gone it has been found that if rats are markedly reduced in a community, typhus infection in human beings disappears. Undoubtedly measures directed against rat fleas and other ecto-parasites play a part and if they could be made sufficiently effective, would control the disease. Up to the present, however, it has been found much easier to attack the rat than to attack its parasites. Of course any attack upon the rat necessarily attacks the parasites.

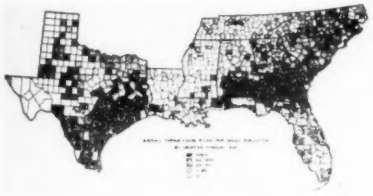
The epidemiology of typhus fever to date has marked the disease in the United States as one appearing principally in communities and rather rarely seen in rural areas. This rather strongly suggests that the rat is almost alone as the animal reservoir of infection, for were field animals extensively infected, we would expect to find a higher rural incidence. The rat, of course, is not a strict urban dweller, often going into the fields when food supplies therein are particularly attractive, but the common rats of this country are not prone to field wanderings and when they do, will generally be in aggregations near human habitations. It is true, of course, that

many farms and other rural homes are rat-infested, but infection from without is not frequently carried to such locations. When it is, relatively few cases develop since the rural human population itself is relatively sparse.

As with most rules, we find that one designating aggregation of rats in urban communities pointed by exceptions. During the plague outbreak in Beaumont, Texas, in 1920, an extensive seasonal migration of Norway rats into the surrounding rice fields was noted. Similar seasonal migrations of rats were noted in other parts of Texas, and in Lavaca County is locally credited with being the cause of an outbreak of 120 cases of typhus fever in one month among some three thousand laborers imported at harvest time. The heavy rat infestation of Southern Georgia and Alabama is largely attributed to the extensive peanut culture in that area.



Maps 2, 3, 4, and 5—Counties in 10 southern states reporting cases of endemic typhus fever in the period 1922-1930, and in the three following 3-year periods.
(Copyright Rand-McNally & Company, Chicago)

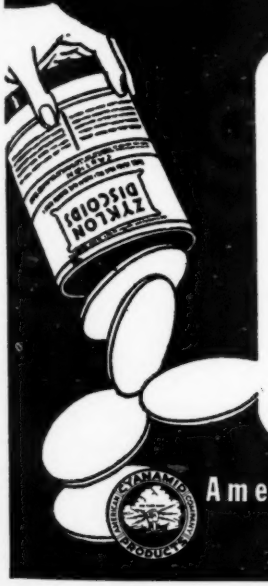


Map 1—The relative importance of endemic typhus fever in individual counties of 9 southern states. Case rates per 100,000 population (1930) by counties, based upon the total number of cases reported by each county from 1922 through 1939.
(Copyright Rand-McNally & Company, Chicago)

In urban communities, however, just as there is a greater aggregation of human beings, there is generally a greater gathering of rats and, there being a greater flow of commerce, the opportunities for infection are multiplied both for the rats and subsequently for human beings. Furthermore, within communities themselves the effect of localized aggregation becomes quite clearly marked, for a study of the foci of infection nearly always clearly demonstrates that they are closely limited to the commercial areas where occur the heaviest rat infestations.

Apparently aggregation of rats has affected typhus incidence over quite large areas. Figure 1, which is reproduced from Meleney*, shows the relative morbidity in counties in

BETTER KILLS BETTER JOBS BIGGER PROFITS



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Southeastern States. It is quite clear that the heaviest infection is in Southern Georgia and Southern Alabama, which as already noted, is the heavily rat infested peanut growing area. A similar demonstration is given in Figure 2, also taken from Meleney, which shows the extension of infection by counties since 1922. It will be noted that this same peanut-growing area still stands out as the principal site of infection. The case reports from Georgia for the past several years show not only by far the greatest number of cases in any State, but show these cases in large majority grouped in the Southern area.

This association of human cases with dense aggregations of rats suggests that the disease as it affects humans might not be as difficult to control as some other rat-borne diseases. There is certainly the suggestion that a relatively small reduction of rat population may largely eliminate human cases. It has been the experience in both Georgia and Alabama in the last few years that if rats are materially reduced in the areas in which they present heavy infestations, that human cases of typhus are brought under reasonable control or disappear entirely. When they reappear, it is generally because efforts of rat control have been permitted to lapse.

To present the picture in a community more clearly, there is shown Figure 3, which is a map of the City of Nashville, Tennessee, in which occurred in 1939 a relatively severe outbreak of typhus. On this map the black dots represent the residences of persons infected, while the lines are drawn from these to the probable sources of infection, in most cases

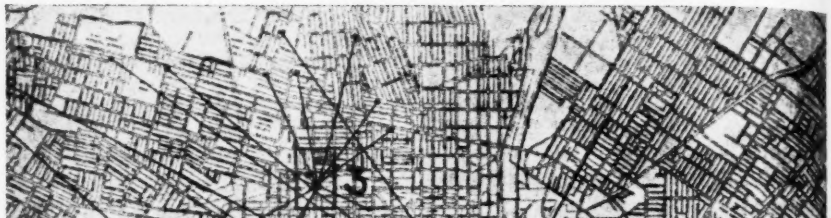
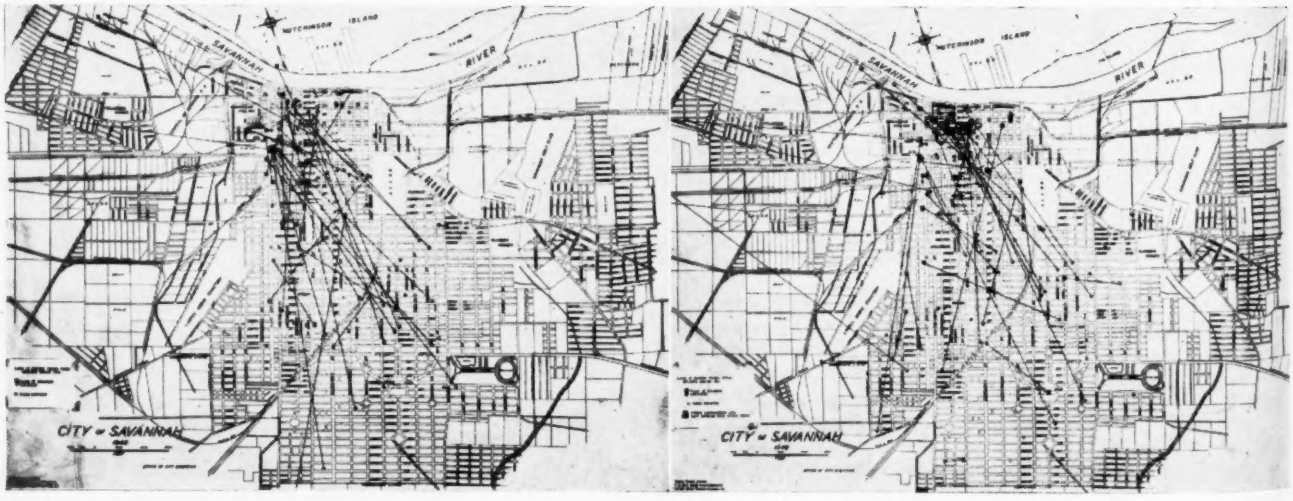


Figure 3—Typhus Fever in Nashville, Tenn., during 1939. Black dots represent residences of cases. Lines extend from residences of cases to foci of infection. Three areas are marked denoting location of intensive rat control measures.

(Copyright Rand-McNally & Company, Chicago)

premises where they were at work. Where no lines are drawn the place of abode and point of probable infection are the same or nearby. At once the picture becomes very clear and it is seen that there were obviously three foci. The presumption was a fair one that if rats could be controlled in those three foci, the disease would disappear. This assumption was borne out when typhus fever was, in fact, brought under control by rat eradicative measures instituted in those three areas. All of these areas were ones in which were large stocks of commercially-stored foodstuffs.

Figure 4 and Figure 5 are spot maps of Savannah, Georgia, for the years 1940 and 1941. Here the same tendency for foci to be limited to commercial areas is evident, but sharp restriction to these, as in Nashville does not appear. Typhus has existed in Savannah for quite a number of years with the evident result that it has spread from the large rat aggregations to a number of smaller foci. We are inclined to believe, however,



Figures 4 and 5—Typhus Fever in Savannah, Georgia, during 1940 and 1941. Black dots represent residences of cases. Lines extend from residences of cases to foci of infection.

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that efforts, now under way, directed at the main commercial areas will bring the human incidence under control and that these smaller foci will disappear.

Having brought our problem down to one of rat eradication, there seems little point in again going over in detail the measures employed for this purpose except to summarize a rather recent development in this field and to emphasize the efficiency of fumigation. The usual measures, as you have often heard, are trapping, poisoning, fumigation and rat-proofing.

Rat-trapping and rat-poisoning are expert trades requiring for their successful prosecution an accurate knowledge of the habits of rats, the ability to detect signs of infestation and locate harborages and long experience as to proper places to set traps and place poison, as well as a knowledge of what are the most attractive baits. An expert worker will destroy five or six times as many rats as a novice. His knowledge of rat signs will not only enable him to separate infested from non-infested premises, but will guide him to those portions of infested premises where the rats are most likely to be operating or accessible.

The evaluation of the signs of infestation has been brought to a state of almost unbelievable accuracy, particularly in ship inspections where inspectors are required to estimate very closely the numbers of rats on board. Usually the estimates of an expert inspector will be within 10 per cent of the actual figures. This is difficult to prove in buildings but on shipboard has been definitely proved time and again.

Rat-proofing consists in original construction or in structural changes designed to eliminate rat harborages as well as to prevent ingress of rats from outside. When well done, it practically eliminates rats in dwellings and in most cases greatly reduces their numbers in commercial establishments, even those where particularly rat-attractive foods are stored. In newly constructed buildings, the cost of rat-proofing is not excessive, but in old buildings the necessary reconstruction may reach prohibitive figures. The high cost has practically ruled out complete rat-proofing as a measure for rat control except in the presence of such a dangerous disease as plague.

In the last few years, the Georgia State health department has evolved a modification of rat-proofing which is not very expensive and which is a definite assistance in the control of rats. The method has been described by Bowdoin and Boston, who have given it the name of "Vent Stoppage." This procedure was designed especially for the control of typhus fever and, while it is applicable to any building, is in practice restricted to the commercial areas in urban communities. Vent stoppage consists in closing all the openings in the periphery of a building, through which rats might enter or leave, and in flashing the edges of doors and similar structures so that rats may not gnaw new entrances. The result is segregation of the rats into restricted units; in fact, an application of the old military principal of dividing the enemy into sections and destroying him piecemeal. Once rats are prevented from going in and out of a building, those inside are destroyed by trapping, poisoning or fumigation, and once they are eliminated, the building remains rat-free so long as the periphery remains closed. Theoretically, the procedure may be applied to single buildings but it has been the experience of Bowdoin and Boston that to secure practically good results, it is necessary to apply vent stoppage to the entire commercial area of a city or town. Probably this is largely for

(Continued on page 22)

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PYRETHRUM vs. ROACHES

By **DR. F. L. CAMPBELL**, *Ohio State University*

Part I

THE following review was written in preparation for research[1] on the effect of pyrethrum[2] on the locomotor activity of roaches. It is concerned with the action of pyrethrum on roaches, the evaluation of pyrethrum against roaches, and the use of pyrethrum for roach control.

Action of Pyrethrum on Roaches
Fumigation

Shafer (1911, 1915) was the first to make a thorough study of the lethal action of insecticides. On roaches he recognized the peculiar stomach and contact action of sodium fluoride, the explanation that is accepted today, but he misinterpreted the action of pyrethrum. He wrote (p. 51, 1915) "In the case of pyrethrum powder, attention was called to the fact that, as applied in most cases, the principal influence of this insecticide is due to the volatile bodies held in the powder. This is very clear when the insect is confined in a warm air-space with some of the powder." In other words, Shafer thought that pyrethrum acted as a fumigant. As the active principles of pyrethrum were then unknown, it is not surprising that Shafer was misled. Evidently he did not take the precaution to keep the air space free of air-floating particles of the powder. After it became known that the pyrethrins are the only active substances in pyrethrum and that they are liquids of low volatility, it seemed less likely that pyrethrum could act as a fumigant. Using honeybees as a sensitive test insect, Ginsburg (1930) carefully excluded particles of pyrethrum powder and droplets of pyrethrum extract from the test chamber and admitted only air that had passed through powder and extract. As the bees were not affected, we have direct evidence that pyrethrum probably does not act as a fumigant. Therefore it must act as a contact or stomach insecticide, the former being much more important than the latter.

Contact Action

To act as a contact insecticide pyrethrum must be brought in contact with the cuticle of the insect in order to exert its characteristic effects. The contact effect of pyrethrum is the same for all insects, differing among different species only in intensity and time of appearance and duration of the steps leading to death or recovery. According to Klinger (1936) these stages are as follows: (1) latent period, (2) period of excitation, (3) period of convulsions, (4) period of paralysis, (5) death. With sublethal doses some insects can reach the stage of paralysis, yet recover completely.

Excitation, convulsion and paralysis indicate that pyrethrum acts directly on the nervous system. Excellent evidence that this is true has been obtained by histological study of ganglia of normal insects compared with ganglia of insects affected by pyrethrum and by other insecticides. Kruger (1931) on mosquito larvae, Wilcoxon and Hartzell (1933) on mealworms, Hartzell (1934) on grasshoppers, Klinger (1936) on caterpillars, and Wigglesworth (1941) on a blood-sucking bug have all shown that pyrethrum produces profound histological changes in the ganglia of these insects —lesions that are characteristic of its effect. Moreover, it has been found by Buchmann (1929) on housefly larvae, O'Kane et al. (1933) on roaches, and Klinger (1936) on sphinx caterpillars that the duration of this latent period depends on the location of the application of a minute quantity of pyrethrum on the surface of the body. The nearer the point of application of the dose to the larger ganglia of the insect, the quicker will be its response.

Careful studies of the contact effect of pyrethrum on roaches have been made by O'Kane (1933) with a petroleum ether extract and by Hockenyos (1936) with pyrethrum powder.

Using a petroleum ether extract containing 15 per cent pyrethrins, O'Kane et al. placed minute droplets weighing from 0.05 to 0.1 mg. at various points on the surface of the bodies of the oriental, American and German roaches, both nymphs and adults. The roaches were provided with collars to prevent them from cleaning off droplets placed on the appendages. The time elapsed from the placing of the droplet to the onset of convulsions was determined and was used as a measure of the permeability of the cuticle at the point of application and as a measure of the relation of response to distance of point of application from the central nervous system.

Convulsions followed the application of the droplet to every point on the surface of the body, except the tip of the long antenna. Placed on the distal end of other appendages (legs, stylets or cerci) convulsions followed. A droplet placed on the middle of an antenna led to convulsions. If, however, the antenna was amputated below the point of application when the first effects appeared, the onset of convulsions was prevented. This demonstrated the time factor in the spread of pyrethrins from the point of application to the central nervous system.

In general the tests showed that sensitivity to pyrethrum varies, depending on the location of the application on the surface of the body and on the sclerotization of the cuticle at the point of application. Sclerotized areas were less sensitive than membranous areas. For areas having the same type of cuticle, the response to treatment was faster the nearer the area was to ganglia of the central nervous system.

Hockenyos (1936), working with oriental roaches and a pyrethrum powder of unknown pyrethrin content, performed dusting experiments that supplement the results of O'Kane et al. Whole roaches were dusted "heavily" (in a manner not described) with pyrethrum powder and with a series of mixtures of this powder and talc. Speed of action was determined by noting time to onset of excitation, convulsions, and paralysis. As would be expected, the straight pyrethrum powder acted most rapidly and the 10:90 mixture least rapidly. However, the 25:75 mixture appeared to act faster than the 50:50 mixture. If not due to chance, this may indicate a difference in adherence of the two mixtures to the bodies of the insects.

[1] A cooperative project of the Ohio State University Research Foundation with the Kenya Farmers Association through the Kenya Pyrethrum Extension Service of New York.

[2] In this review "pyrethrum" refers to solid or liquid insecticidal products made from **Pyrethrum cinerariaefolium** and containing pyrethrin I and pyrethrin II (pyrethrins). To avoid confusion the names of the active ingredients are used only where "pyrethrum" will not suffice.

It was interesting to note that the latent period (1.4 to 1.9 minutes) was about the same for straight pyrethrum and all the mixtures with talc. The difference in effect of the four powders appeared in duration of the period of excitation (from 3 min. with 100:0 to 17 min. with 10:90) and the duration of the period of convulsions (from 7 min. with 100:0 to 18 min. with 10:90). Data on the period of paralysis are not given, though it is shown that after 9 to 11 hours, recovery among insects dusted with the mixtures was greater than among those dusted with straight pyrethrum.

The foregoing experiments indicate to the writer that the speed of toxic action depends on the quantity of pyrethrum applied. It is amazing that pyrethrins in particles of pyrethrum, within two minutes after contacting the cuticle, can produce an exciting effect on the roach. The quantity of pyrethrins required to excite the nervous system must be inconceivably small. In view of the fact that the cuticle of roaches is covered by a delicate, waxy epicuticle and a film of oil (Ramsay, 1935), we can picture the rapid penetration of pyrethrins from the powder by imagining that they go into solution in the outermost oily-waxy layer and penetrate the cuticle through the pore and gland canals, thus reaching the nerve endings in the epidermis.

In addition to dusting whole roaches, Hockenyos applied pyrethrum powder to parts of the surface of the body with a camel's hair brush. These tests, too numerous and varied to be described here, indicated "that with the particular sample of pyrethrum used, an area of one-half or more of the body surface must be covered with dust to insure the insects being paralyzed for at least 12 hours." The dusting of the appendages alone was not sufficient to paralyze the roaches. As O'Kane et al. could paralyze roaches by a minute drop of pyrethrum extract placed on almost any point of the appendage, the difference in effect of powder and extract is brought out. The latter was undoubtedly more effective because the pyrethrins were more concentrated and being in an oil solution were available for penetration immediately on contact with the cuticle.

The work of O'Kane et al. and Hockenyos also show that neither the liquid nor the dust need enter the tracheal system to paralyze the insects; direct penetration of the cuticle by pyrethrins suffices.

While more than one insecticide will paralyze roaches, pyrethrum is unique in the extreme excitation that it causes before paralysis sets in. By the so-called lard can method Barnhart (Campbell et al. 1941) sprayed large nymphs of the German roach in a standard place of concealment. Various oil-base insecticides were used, including the Official (pyrethrum) Test Insecticide of the National Association of Insecticide and Disinfectant Manufacturers (O.T.I.). The writers state, "In all tests driveout by the O.T.I. was remarkably uniform and always exceeded the driveout caused by insecticides that did not contain pyrethrins." The driving out of roaches from cracks in which they are concealed is undoubtedly a result of the effect of pyrethrum on locomotor activity. Running wildly, the sprayed or dusted roaches find by chance the exits from their hiding places and many emerge from them before they are seized with convulsions. This effect is useful in practice for locating roach infestations and for causing roaches to run into powder deposits or into a direct spray or dust.

The initial effect of pyrethrum on the nervous system of the German roach has another action that aids in control—a phenomenon first pointed

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out by Woodbury (1938) and studied carefully by Parker and Campbell (1940). All adult female German roaches that receive an effective dose of a pyrethrum spray drop their egg capsules prematurely. Although some of these capsules may hatch later, the per cent hatch is less than that which would have occurred, if the capsules had remained attached to the female. Dropped capsules lose water and shrink. The younger the eggs in these capsules, the more likely it is that the embryos in them will fail to mature and hatch. The dropping of the capsules is brought about through the nervous system by contraction of the abdomen. Pyrethrum is the only insecticide known to the writer that has this curious and useful effect.

Paralysis of roaches, as well as of houseflies and other insects, may be caused by sublethal doses of pyrethrum from which the insects may recover completely. In practice therefore, opportunity to collect and destroy paralyzed insects should not be overlooked, but it is better to make thorough treatments, thus insuring the ultimate death of insects that are hit by spray or dust. Whereas houseflies sprayed with pyrethrum-oil either die or recover within 24 hours, Woodbury (1938) found that roaches may linger in a moribund condition. Those that are moribund after 24 hours do not recover.

Stomach Action

We may now ask whether pyrethrum does or can act as a stomach insecticide. In practice it is unlikely that pyrethrum acts as a stomach insecticide, because an insect must come in contact with it before it can eat or drink it. The rapid contact effects would probably prevent the insect from ingesting a lethal dose. Moreover, the rapid loss of toxicity of pyrethrum deposits would prevent the lasting protective effect characteristic of stomach insecticides.

Whether pyrethrum can act as a stomach insecticide in specially designed laboratory experiments is another question of academic rather than practical interest. The evidence at hand says yes and no.

The first experiments having a bearing on this question were made by Saling (1928) on the American roach. Looking for a method for biological evaluation of pyrethrum, he decided to feed measured quantities of pyrethrum extracts to roaches. He found that a mineral oil (Paraffinum liquideum D.A.B.) was imbibed by roaches when applied to their mouthparts by a calibrated capillary pipette (like a baby drinking from a bottle) and that the ingested oil produced no ill effects. He found further that this oil was suitable at 100° C. for complete extraction of pyrethrins from pyrethrum powder and that the roaches would imbibe the extract with fatal results. The same was true of houseflies. Two years later Buchmann (1930) made similar experiments, injecting oil extracts of pyrethrum into the oral cavity of the American roach and the giant roach, **Blabera fusca.** Both lethal and sublethal doses were introduced into the alimentary tract in this way, with the usual chain of events following the treatment.

Since O'Kane et al. (1933) showed that roaches can be killed by placing minute quantities of a pyrethrum concentrate on the mouthparts, the lethal effects of oral administration by Saling might be attributed to the contact of the extract with the external cuticle of the mouthparts. However, if Buchmann injected the extract into the pharynx, he may have avoided all external contact of the extract with the cuticle, and if he did not injure the intima of the gut in making the injection, one must conclude that the stomach action of pyrethrum has been demonstrated — at least for pyrethrum-oil in roaches.

Bottcher (1938) also claims to have demonstrated stomach action of pyrethrum in a liquid. He fed alcoholic extracts of pyrethrum in sugar solution quantitatively to individual honeybees with fatal results. He concluded that pyrethrum is a very powerful stomach insecticide. However, the possibility of external contact effect on the mouthparts was not excluded. Moreover, he did not give results of feeding the alcoholic medium without pyrethrum, leaving open the possibility that the medium itself might have been toxic.

In spite of the doubts just expressed, the evidence is fairly strong that pyrethrum in solution in oil or dispersed in water may act as a stomach insecticide. Pyrethrum powder, however, has not been found to act as a stomach insecticide. Investigating this question, Swingle (1934) imbedded the powder in a thin gelatin film and fed the film between leaf disks to imported cabbage worms, in this way avoiding its contact action. The insects were not affected by eating either gelatin or pyrethrum-gelatin films. On the other hand, these larvae were killed by contact action of pyrethrum when they crawled on the surface of these same films. Pyrethrum between leaf disks without gelatin was also consumed by the larvae without effect. These experiments led to more extensive work by Woke (1939) on the same question, using the southern armyworm, which also eats with impunity leaf sandwiches containing pyrethrum. By using a sensitive biological test for pyrethrum in the gut contents, tissues, and excrement of the southern armyworm, Woke demonstrated that the pyrethrins ingested are destroyed in the gut before they can exert their characteristic effects.

Voskresenskaya (1938), influenced by Swingle's work, also used the leaf sandwich method to feed pyrethrum powder to three species of caterpillars and to the migratory grasshopper. After consuming the sandwich, all insects regurgitated and became paralyzed — effects not observed in the work of Swingle and of Woke. Whether the dose taken by the Russian insects was larger or external contact by the insects with the powder was less carefully avoided is not known. At any rate all paralyzed insects recovered and resumed feeding the day after eating the sandwiches. Voskresenskaya concluded that pyrethrum cannot be regarded as an effective stomach insecticide.

With a camel's hair brush Hockenyos (1936) thoroughly dusted the antennae or legs of oriental roaches with pyrethrum powder. As the contact effect was not sufficient to paralyze them, the roaches cleaned their appendages in their mouthparts, thus ingesting the powder. Two successive treatments of the antennae did not cause the roaches to ingest enough

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powder to affect them. Perhaps pyrethrum powder is inactivated in the gut of oriental roaches as it is in the gut of the southern armyworm.

Relative Susceptibility

Different species of insects and different instars or stages of the same species may differ greatly in their susceptibility to the action of pyrethrum. Klinger (1936) has made a remarkably thorough study of the factors governing relative susceptibility and found that it depends in large part on the size of the insect and thickness and density of its cuticle.

No quantitative tests have yet been made to determine the relative susceptibility of different species of roaches or of the susceptibility of roaches in comparison with that of other household insect pests. Passerini (1924) tested a pyrethrum powder against a large number of species of insects and other arthropods. He classified them in four categories of susceptibility and placed roaches in the most susceptible group. Abbatucci and Roubaud (1926) testing a pyrethrum-oil spray against German and oriental roaches and other household insects, concluded that roaches were more resistant than lice, fleas, mosquitoes, houseflies and blowflies. Preliminary results in the writer's laboratory indicate that roaches are among the more resistant of the household insect pests and that the firebrat is most susceptible.

Regarding relative susceptibility of different instars of nymphs or larvae, it is probably generally true that resistance increases with age, presumably because the cuticle becomes thicker as the insect grows older and because volume of the body increases faster than surface. Certainly the tests made in the writer's laboratory indicate that resistance of the German roach to pyrethrum increases from first to sixth instar. It might be supposed that the adult roach having wings and being larger than the sixth instar nymph would be still more resistant, but steam vaporizer tests in a Peet-Grady chamber in the writer's laboratory against a mixed group of German roaches of different ages showed that any survivors after the treatment were always large nymphs, the adults and smaller nymphs having been killed. Recent careful tests by McGovran and Fales (1941) indicate that large nymphs stand in resistance between adult males and adult females, the latter being most resistant. No doubt the position of large nymphs with respect to adults would depend on age of the latter. Using a pyrethrum-oil spray, Tuma (1938) made an exhaustive study of the relation of age to susceptibility in the German roach. He found that roaches reared at 85° F. were most resistant at 17 weeks of age. He did not mention the stage of the insects at this age, but they should have been adult according to our experience. If so, our observations do not agree with Tuma's. We are agreed, however, that at some point in the life of a German roach it reaches a peak of resistance to pyrethrum.

Although Tuma must have worked with adults as well as the nymphal instars, he did not consider the relative susceptibility of the sexes to pyrethrum. Nelson et al. (1934) implied that a difference in susceptibility existed because they recommended sexing the adults used in their drop tests. In quantitative comparisons, using the O.T.I., Woodbury (1938) has shown that adult female German roaches are decidedly more resistant than adult males—the same situation that exists in houseflies. In terms of spray deposit required to kill 50 per cent of the insects, he found that the relative resistance of adult females,

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adult males and second instar nymphs was 4.5 : 2.5 : 1.

Because the adult female German roach carries her egg capsule (ootheca) until it hatches, it is of interest to know the relative susceptibility to pyrethrum of the female and the eggs within the ootheca. Using the O.T.I. and a stronger pyrethrum spray, Parker and Campbell (1940) showed that eggs in the ootheca are more resistant to the spray than are the females, particularly at doses that give a high kill of females.

What information is lacking in the foregoing review that could be supplied by research with existing methods?

We are not sure that pyrethrum has no fumigating effect against roaches. For a drastic test one could take an oleoresin of pyrethrum from which the solvent had been completely evaporated and confine roaches near it at a high temperature in a small closed space. An oleoresin from field daisies might be used as a check.

It is possible to get much more information on the physiological effects of pyrethrum on roaches. For example, the activating effect of pyrethrum can not only be timed but can be recorded by kymograph as suggested by Yeager and Swain (1934). The effect of pyrethrum on the action of the isolated heart of roaches can be studied by the mechanographic method used for nicotine by Yeager (1938). Effect on circulation of blood can be studied by the use of suitable injected indicators. Effect on movements of the spiracles can be studied as suggested by Wigglesworth (1941). Incidentally, Wigglesworth suspected that death of insects paralyzed by pyrethrum might be caused by opening of the spiracles and resulting desiccation, but determinations of water loss from paralyzed **Rhodnius** and observations of the spiracles of paralyzed bedbugs failed to show that this hypothesis was true; moreover death could not be attributed to starvation. "The cause of death . . . therefore remains obscure."

The effect of pyrethrum on gas exchange of roaches can easily be studied, as well as its effect on directed circulation of air through the tracheal system (cf. Kitchel and Hoskins, 1935). Because oxidation of pyrethrins destroys their toxicity, it would be interesting to study the effect of the atmosphere surrounding roaches on their response to pyrethrum.

The effect of other environmental factors on the toxicity of pyrethrum to roaches needs investigation. What of temperature, relative humidity and light? Since light tends to destroy pyrethrins, would insects exposed to light after paralysis have a greater tendency to recover than those placed in the dark at the same temperature and relative humidity?

Still other aspects of toxicity that can be measured by per cent mortality or by the time period for certain toxic effects to appear or disappear remain to be studied. Dosage-effect and concentration-effect curves should be worked out both for lethal and sublethal doses. Subsequent effects, if any, of sublethal doses on development and reproduction of roaches should be studied, including effects of repeated sublethal doses on the same insects. The question of the effect of sublethal doses on the resistance of roaches to subsequent higher doses (cf. McGovran et al. 1939) is worth answering.

Much work remains to be done on relative susceptibility to pyrethrum, not only between species of roaches and between roaches and other household insects, but within a species of roach. One question that has not been studied at all is the change in susceptibility during a stadium or instar. What is the relative susceptibility of roaches just before and just after a molt, and in the middle of a stadium?

The determination of the relative toxicity of pyrethrin I and pyrethrin II to roaches awaits a sufficient supply of reasonably pure materials. In the course of their chemical work on pyrethrins, Staudinger and Ruzicka (1924) made tests on the German roach. Without going into details they stated that pyrethrin I is somewhat more toxic to this insect than pyrethrin II. At a dilution of 1:10,000, pyrethrin I killed in 10 to 20 minutes and pyrethrin II in 20 to 40 minutes. Against the American roach McGovran and Mayer (1941) found that pyrethrin I gave a higher kill than pyrethrin II at certain concentrations, but that pyrethrin II gave a quicker knockdown than pyrethrin I and paralyzed more roaches than the latter. The samples tested were not pure, but were rich in I or II (85 per cent I plus 15 per cent II and 95 per cent II plus 5 per cent I).

In most of the work suggested above, it would, of course, be of interest to study not only the effect of pyrethrum, but also the comparative effects of other insecticides alone and in mixture with pyrethrum. The action of mixtures of insecticides is a complicated but important subject that has so far received little quantitative study that is fit for interpretation.

(To Be Concluded)

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Literature Cited

Anonymous. 1932. Toxicity of pyrethrum extracts by the roach test method. Soap 8(1):107-109.

Anonymous. 1940. What composition for roach powders? Soap and San. Chem. 16(10):92-94, 109; (11):96-99, 111.

Abbatucci, S. and E. Roubaud. 1926. Experiences sur un liquida insecticide commercial a base de petrole et de poudre de pyrethre. Bul. Soc. Path. Exot. 19(10):901-903.

Back, E. A. 1937. Cockroaches and their control. U. S. Dept. Agr. Leaflet 144. 6 pp.

Bottcher, F. K. 1938. Untersuchungen uber den Einfluss von Pflanzenschultzmitteln auf die Bienen. III. Teil: Die Wirkung von Pyrethrum auf die Bienen. Ztschr. Angew. Ent. 25(3)419-441.

*Buchmann, W. 1929. Weitere Untersuchungen uber die Wirkung von Pyrethrumpulvern auf die Muscidenbrut. Ztschr. Desinf. u. Gesund. 21:14-16, 37-39, 72-76.

*Buchmann, W. 1930. Versuche zur quantitativen Wertbestimmung von Pyrethrum-Insektpulvern durch den physiologischen Tierversuch. Ztschr. Desinf. u. Gesund. 22(5):414-418. 1930.

Campbell, F. L., C. S. Barnhart, and J. M. Hutzel. 1941. Tests on crawling insects. Evaluating liquid household insecticides against the German cockroach and bedbugs . . . Soap and San. Chem. 17(7):105-107, 109, 111, 113, 115; (8):105, 107, 109, 111, 113, 115, 121.

Ginsburg, J. M. 1930. Test to determine toxicity of pyrethrum vapors to honeybees. Jour. Agr. Res. 40(11):1053-1057.

Gilbert, I. H. 1941. Evaluation of immediate effectiveness of roach powders against the German and American cockroach. Ohio State Univ. Master's Thesis. 32 pp.

Gnadinger, C. B. 1936. Pyrethrum flowers. 2nd ed. 380 pp. Minneapolis, Minnesota.

Hartzell, A. 1934. Histopathology of insect nerve lesions caused by insecticides. Contrib. Boyce Thompson Inst. 6(21):211-223.

Hockenyos, G. L. 1936. Mechanism of absorption of pyrethrum powder by roaches. Jour. Econ. Ent. 29(2):433-437.

Howard, L. O. and C. L. Marlatt. 1896. The principal household insects of the United States. Bul. 4 New Series. U. S. Dept. Agr. Div. Ent. 130 pp.

Kitchel, R. L. and W. M. Hoskins. 1935. Respiratory ventilation in the cockroach in air, in carbon dioxide and in nicotine atmospheres. Jour. Econ. Ent. 28(6):924-933.

Klinger, H. 1936. Die insektizide Wirkung von Pyrethrum-und Derrisgiften und ihre Abhangigkeit vom Insektenkorper. Arb. Physiol. Angew. Ent. Berlin-Dahlem. 3(1):49-69; (2):115-151.

Kruger, F. 1931. Untersuchungen uber die Giftwirkung vom dalmatischem Insektenpulver auf die Larven von **Corethra plumicornis.** Ztschr. Angew. Ent. 18(2):344-353.

Laudani, H. and H. L. Sweetman. 1941. Roach control. A study of relative efficiency of various commonly used insecticide dusts against roaches. Soap and San. Chem. 17(6):129, 131, 133, 135.

McDonnell, C. C., R. C. Roark, and G. L. Kennan. 1920. Insect powder. U. S. Dept. Agr. Bul. 824. 100 pp.

McGovran, E. R. and J. H. Fales. 1941. Roach sprays: A preliminary report of a new laboratory method for testing. (Manuscript to be published. Read at meeting of Nat. Assoc. Insect. & Disinfect. Mfgrs. Dec. 1941.)

McGovran, E. R. and E. M. Mayer. 1941. Toxicity of pyrethrins I and II in kerosene to the American cockroach. Mimeographed circular Bur. Ent. & P. Q., U.S.D.A. E-544. 8 pp.

McGovran, E. R., W. N. Sullivan, and G. L. Phillips. 1939. Resistance to insecticides. The effect of knockdown and light doses on the resistance of houseflies to pyrethrum sprays. Soap and San. Chem. 15(8):88-90.

Nelson, F. C., H. E. Buc, N. A. Sankowsky, and M. A. Jernakoff. 1934. Evaluating liquid insecticides. Soap 10 (10):85, 87, 89, 91, 105, 107.

O'Kane, W. C., G. L. Walker, H. G. Guy, and O. J. Smith. 1933. Reactions of certain insects to controlled applications of various concentrated chemicals. N. H. Agr. Expt. Sta. Tech. Bul. 54. pp. 3-20.

Parker, B. M. and F. L. Campbell. 1940. Relative susceptibility of the ootheca and adult female of the German cockroach to liquid household insecticides. Jour. Econ. Ent. 33:610-614.

Passerini, N. 1924. Sopra l'azione della polvere di "**Pyrethrum cinerariaefolium**" Trev. sugli insetti e su qualche altro artropoda. Nuovo. Giorn. Bot. Ital. 31(1):36-49.

Ramsay, J. A. 1935. The evaporation of water from the cockroach. Jour. Expt. Biol. 12(4):373-383.

Saling, T. 1928. Uber das wirksame Prinzip von Pyrethrum-Insektenpulvern und eine neue biologische Methodik ihrer Wertbestimmung. Ztschr. Desinf. u. Gesund. 20(3):33-42.

Shafer, G. D. 1911, 1915. How contact insecticides kill. Michigan Agr. Col. Expt. Sta. I & II Tech. Bul. 11. 65 pp. and III Tech. Bul. 21, 67 pp.

Staudinger, H. and L. Ruzicka. 1924. Insektentotende Stoffe I. Uber Isolierung und Konstitution des wirksamen Teiles des dalmatinischen Insektenpulvers. Helv. Chim. Acta 7:177-201.

Sullivan, W. N., L. D. Goodhue, and J. H. Fales. 1941. Toxicity to adult mosquitoes of aerosols produced by spraying solutions of insecticides in liquefied gas. (Manuscript to be published. Read at Eastern Branch meetings of Amer. Assoc. Econ. Ent. Baltimore, Nov. 1941.)

Swingle, M. C. 1934. Difference in action of derris and pyrethrum against the imported cabbage worm shown by experiments with gelatin films containing these plant materials. Jour. Econ. Ent. 28(5): 1101-1102.

Tuma, V. 1938. Roaches. A study of the relationship between the ages of cockroaches and their resistance to liquid insecticides. Soap and San. Chem. 14(6):109-111, 113, 115, 117, 151.

*Voskresenskaya, A. K. 1938. (Can pyrethrum be used as a stomach insecticide.) (In Russian.) From Summary of the Scientific Research Work of the Institute of Plant Protection for the Year 1936. Part III. pp. 93-95. Leningrad.

Wigglesworth, V. B. 1941. The effect of pyrethrum on the spiracular mechanism of insects. Proc. Roy. Ent. Soc. London. 16(1-3):11-14.

Wilcoxon, F. and A. Hartzell. 1933. Some factors affecting the efficiency of contact insecticides. III. Further chemical and toxicological studies of pyrethrum. Contrib. Boyce Thompson Inst. 5(1): 115-127.

Woke, P. A. 1939. Inactivation of pyrethrum after ingestion by the southern armyworm and during incubation with its tissues. Jour. Agr. Research 58(4):289-295.

Woodbury, E. N. 1938. Test methods on roaches. German cockroach as a test insect for liquid petroleum insecticides . . . Soap and San. Chem. 14(8):86-90, 107, 109.

Worsley, R. R. LeG. 1936. The insecticidal properties of some East African plants. II. **Mundulea suberosa** Benth. Ann. Appl. Biol. 23; 311-328.

Yeager, J. F. 1938. Mechanographic method of recording insect cardiac activity, with reference to effect of nicotine on isolated heart preparations of **Periplaneta americana.** Jour. Agr. Research 50 (4):267-276.

Yeager, J. F. and R. B. Swain. 1934. An entomotograph, an instrument for recording the appendicular or locomotor activity of insects. Iowa Jour. Sci. 8:519-522.

—Soap and Sanitary Chemicals, April, 1942.

Rat Invasion

Earl Young, of Thomaston, Ga., was given a white rat, which he placed in a neat little wire-and-wood box in his back yard. A few days later seven young gray rats gnawed their way into the box to share the luxurious quarters.

—The Atlanta Journal.

Ten-Pin Alley

By Irvin Rudick

He was the best practice bowler in the Monday night bowling league. Big 200 game scores were mere child's play to our grandpappy of the Gymal Doled alleys.

He was kidded and ribbed by the younger squirts when he had more than a little trouble hitting a 150 average on league nights.

But Max J. Levy of the Twin City Exterminating Co. could take it. "If only I had a big league night sometime," thought the exterminating man.

It came, the night that Max had dreamt about. It happened the Monday before the close of the "A" league bowling season, and the "young squirts" have retired sheepishly to their bench seats, admitting that maybe everything Max told 'em was the McCoy.

For Pappy Max stepped out with that crazy ball of his—it zig-zags a course resembling that of a steamer eluding torpedoes in war-infested waters. But Max was "on" to the extent of a 277 game, a record for the season in any of the club's leagues, and second highest single game ever rolled since we started bowling at G. D.

And the grand old fella started out with a wide open split, too. Thereafter it was 10 successive strikes, and poor Max was nearly mobbed as all the other league bowlers rushed in to congratulate him.

May we also extend our "congrats," Max. This makes you as good a bowler as you are a PCO.—Ed.

He who talks big—thinks little.

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Acme FULL VISION Gas Masks are now being used in all parts of the world by the fumigating industry. Acme Masks are noted for their protection to the wearer against fumes resulting from the fumigating gases and chemicals being used.

Acme Gas Masks provide the wearer with FULL VISION through the wide, safety glass lenses which do not steam-up or become fogged. This feature enables the employee to speed up his work because his vision is not distorted.

Always specify the type of gas or chemical being used, when ordering Acme Canisters—best results are then assured.

Write for Folder PM 387 which describes Acme Gas Masks in detail. Specify quantity of Acme Masks desired when asking for prices.

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Annual Insect-Damage Appraisal

BECAUSE the suggestions he presents represent much reflective thinking on a subject of major importance for the entomologist, and in view of their analagous interest for the PCO, who is "mostly entomologist" anyway, on the questions of research and supplies, J. R. Parker's Presidential Address, "Annual Insect-Damage Appraisal," before the Fifty-third Annual Meeting, American Association of Economic Entomologists, published in February '42, Journal of Economic Entomology, is recommended reading for members of the Industry.

Meanwhile, preface of Mr. Parker's address is reprinted here:

Our Nation is at war. Billions for defense must be provided by ever-increasing taxes. Financial support for all nondefense spending on the same scale as in normal years seems impossible. Judgment will be passed on the relative value of the many activities conducted with tax-payers' money. Support for those considered most essential will doubtless continue; less essential ones may be entirely eliminated, or continued on a much reduced scale.

In which category will entomology find itself after it has been tried in the court of public opinion and by the State and Federal governments whose decisions are rendered in terms of dollars appropriated? Most of us sincerely believe our work is essential and highly productive during normal times, and is even more important when national defense is at stake. In support of our convictions we cite the need of preventing extensive insect injury to growing crops, animals, stored products, and lumber, all of which are needed to support our civilian population and maintain the defense program. We also call attention to the necessity of controlling insects affecting the health and comfort of man when large numbers of men are concentrated in army camps and industrial centers.

The conviction of entomologists that their work is essential to public welfare carries no assurance of the acceptance of this belief by the public or by those in authority. Scientists in other fields, no doubt, are just as firmly convinced that their services are of equal or greater importance. It would seem that national welfare could best be served by the accumulation and presentation of data relative to the cost and probable returns of all scientific work so that governing agencies may more easily recognize those phases which are most deserving of financial support.

Entomologists should concern themselves with presenting the arguments for insect control and research. As public servants, they should also call attention to the profits on past investments of public funds in entomology and the probable returns on future expenditures. Such arguments and statements would be more convincing if they indicated the yearly insect damage before control and research were conducted, the reduction in damage and the resulting savings accomplished by money already spent, and the possibilities of still greater savings by continuing and intensifying control and research programs.

At this point we find ourselves in an embarrassing position. We have neglected to accumulate certain data which, if now available, would greatly strengthen our presentation of entomology as a public service. We are sure public funds expended for entomology in the past have yielded unusually high returns, but we lack the detailed information which is needed to make our claims most convincing. We know that regardless of improvement and greater use of control methods, enormous insect damage still occurs, but we have no reliable information on the total annual loss. Experiments, demonstrations, and surveys have been conducted for particular insects in which damage and its reduction by control methods have been accurately measured, but in no instance has any sound, scientific method been employed to determine for the United States as a whole the total annual loss caused by a representative group of our more important insect pests. We have failed to develop a system of appraising annual insect damage on a state or national basis.

With the hope of arousing action which will make our work still more effective and strengthen our position as essential public servants I am going to bring to your attention the questionable nature of past estimates of insect damage, the needs for a sound system of annual insect-damage appraisal, several suggestions as to how it could be organized and operated, and the benefits which might result from its use.

In addition, as his preface indicates, his address covers in considerable detail, the ensuing related topics: Questionable Value of Past Statements on Annual Insect Damage. . . . The Need for Annual Appraisal of Insect Damage. . . . 1. To give the public a better basis for judging the importance of entomology. . . . 2. To give the public an accounting of the funds it has invested in entomology. . . . 3. To secure greater returns on public funds invested in entomology. . . . Suggestions on Type of Organization Needed . . . . Benefits Gained by Annual Appraisal of Insect Damage and Abundance.

**Bureau of Entomology and Plant Quarantine, U. S. Department of Agriculture, Bozeman, Montana.*

Abstract of Addresses Prepared for use at Second Inter-American Conference of Agriculture

Mexico City, July 6-16, 1942

"Insect Control Is Vital to Nation's Safety in Wartime"

Dr. Fred C. Bishopp, Assistant Chief, Bureau of Entomology and Plant Quarantine, U. S. Department of Agriculture.

Insects are of vital importance in wartime when large numbers of men are concentrated in camps and moved to new environments. Insect-borne diseases—which normally are sporadic in occurrence — develop under such conditions into serious outbreaks. Among the insect-borne diseases he mentioned malaria, yellow fever, dysentery, cholera, encephalomyelitis, typhoid fever.

Modern transportation aids in the spread of insects. Malaria and yellow fever mosquitoes can be transported easily by airplane. Development of the aerosol method of dispersing insecticides has been highly effective for killing insects in airplanes.

Referring to the passage of federal legislation and the establishment of anti-malarial organizations in Argentina and Venezuela, Dr. Bishopp advocated such organizations in all American countries . . . An outstanding example of co-operation in mosquito eradication, he said, was that between the Brazilian Government and the International Health Board of the Rockefeller Foundation by which a deadly carrier of malaria, accidentally established in Brazil, was eradicated from that country.

"Americas Can Produce More Materials for Insecticides"

R. C. Roark, Chemist, Bureau of Entomology and Plant Quarantine, U. S. Dept. of Agriculture.

With the diversion of large quantities of materials used in insecticides for immediate war production, one of the most serious problems facing entomologists is the development of effective substitutes.

Our main supply of some of the most effective organic insecticides

(Continued on page 24)

Volatile Fluorine Compounds for the Control of Insects

By S. MARCOVITCH, *University of Tennessee, Knoxville*

THE insecticidal properties of fluorides are well known, and it is not surprising that the volatile fluorine compounds have also excellent possibilities as fumigants in insect control. Hydrofluoric acid, silicon tetrafluoride, hydrofluosilicic acid, and boron trifluoride were found to possess high toxicity against a wide variety of insects such as grain weevils, bean weevils, bedbugs, roaches, and others.

Hydrofluoric acid gas may be generated by the use of calcium fluoride and sulphuric acid. This reaction will not go to completion without heat. The pure anhydrous acid may also be used from containers such as cylinders, or adsorbed on inert materials, such as carbon, in the form of discoids. In generating the hydrofluoric acid, finely ground fluorspar was mixed with an equal weight of calcium carbonate. The carbon dioxide thus produced gives a better production of hydrofluoric acid. Phosphate rock which normally contains about 5 per cent fluorine may also be used for generating hydrofluoric acid and silicon tetrafluoride but this process requires more sulphuric acid.

Tests against the cowpea weevil indicate that they could easily be killed in two hours by the hydrofluoric acid generated from .05 gram of calcium fluoride per cubic foot (1.5 mg. per liter) or about 2 ounces per 1,000 cubic feet. The larvae within the cowpeas required a concentration of 8 ounces per 1,000 cubic feet. This dosage did not prevent the germination of corn. At these rates hydrofluoric acid gas is as toxic as hydrocyanic acid. Since hydrocyanic acid is the most toxic insect fumigant used, it is evident that the volatile fluorine compounds possess considerable merit.

But hydrofluoric acid has a distinct advantage over hydrocyanic acid in that it is not as toxic to man or mammals. It is well known that fatalities often result with hydrocyanic acid when the gas is taken into the lungs by accident. This is not likely to happen with hydrofluoric which has a very penetrating odor and irritating effect on the nose and thus gives a warning of its presence. In tests conducted against rats it was not fatal when used at the rate of 2 ounces of calcium fluoride per 1,000 cubic feet, even though the animals remained in the fumigation chamber for 1 hour. This would indicate that the hydrofluoric acid is a comparatively safe fumigant as compared with the more widely used hydrocyanic acid.

Machle and others stated that in degree to toxicity for rabbits hydrogen fluoride appears to be of the same order as hydrochloric acid and sulfur dioxide. They also stated that 0.0245 mg. per liter caused no deaths in six animals exposed for 41 hours.

Roark found dichlor difluor methane with 0.4 per cent pyrethrins and 1 per cent oil of sesame to be a good fumigant for use in the control of houseflies.—3-16-42.

LITERATURE CITED

Machle, W., F. Thamann, K. Kitzmiller, and J. Cholak. 1934. The effects of the inhalation of hydrogen fluoride. Jour. Ind. Hygiene 16: 129.

Sanders, G. E. 1942. House fly control in relation to Poliomyelitis. Pests and Their Control 3: 22.

—*From Journal of Economic Entomology, April*, 1942.

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The Control of Endemic Typhus Fever

(Continued from Page 13)

the reason that the buildings themselves constitute the principal rat harborages and unless rats are eliminated in all of them, the pressure from the infested ones is such as to break through the barriers in the vent-stopped structures. This does not mean they break through the actually closed openings, but that they will get through occasionally opened doors or other temporary unblocked entrances.

Like all other rat control measures that have been evolved to date, vent stoppage obviously requires maintenance. Structures must be periodically inspected and all breaks or potential breaks repaired. Doors must be reflashed from time to time, wire netting on ventilators renewed, etc., etc.

Vent stoppage by itself does not eliminate rats. These must be destroyed in the vent-stopped buildings. No attempt is made to eliminate the harborages inside the building and consequently the rats still have a home and usually a food supply within the building. Hence, if they are not completely trapped out, they remain within the building, even though they cannot communicate with the outside. Once they are completely trapped out of a building, however, the occasional rat that gets through the barriers can usually be readily eliminated with not too great continuous effort. In some buildings, however, this is not the case. Sometimes it is found that the harborages are so extensive and the food supply is so great that the rat colony within the building maintains itself, even in the face of ordinary destructive measures, such as trapping and poisoning. The possibility of this will be realized when it is noted that the theoretical increase of a rat colony is somewhere in the neighborhood of 6 per cent per day, and that large colonies may number from a hundred to a thousand. When such a condition is encountered, more drastic measures must be taken. Either rat harborages must be eliminated so that the rats become more accessible to destruction or fumigation must be resorted to.

In buildings where large stores of food stuffs are kept over relatively long periods, rats often harbor among the stacked merchandise. This occurs even in otherwise completely rat-proof buildings. In some cases they may be controlled by periodic restacking. In others periodic fumigation is found less expensive. In too many instances they are tolerated, even though large sums may have been spent for rat-proofing and damage to stores becomes a serious item of cost.

In the past ten or fifteen years, cyanide fumigation has been greatly improved and its use has so spread that there are now available a very considerable number of persons expert in its application. In the hands of a fumigation expert, there is very little danger to human life from fumigation with hydro-cyanic acid. In the hands of an inexperienced person, it is a very dangerous gas, not only to others, but to the fumigator himself. The fumigation expert today does not merely release gas inside of the building and trust to luck that it will penetrate to the spaces where the rats are concealed. He first hunts out the rat harborages and then blows the gas into them. If necessary, even removing parts of the wall or floor and even, in some instances, blowing the gas directly into rat burrows. Once the harborages are gassed, the fumigant is released throughout the building and allowed to remain for a variable period, usually two to eight hours. Subsequent aeration is usually accomplished by simple ventilation by opening of doors and windows, etc. When carefully performed, the fumigation of a building will generally kill all the rats therein. Even when poorly performed, it will generally eliminate better than 80 per cent.

In all rat control programs one of the truly important factors, and one unfortunately too often overlooked, or insufficiently stressed, is control of garbage. Of course this may be amplified to include control of any and all rat food, but garbage is the particular food supply that is so carelessly handled as to be nearly always available to rats. Anyone who doubts the particular importance of garbage as a rat food should visit any large garbage dump, of which there are many in this country, and see with his own eyes the hordes of rats they support. So important is garbage control that some sanitarians believe that if this rat food supply could be completely protected the solution of the rat problem would become a simple matter.

No method of rat control has yet been devised that operates automatically, all require some intelligent maintenance. This country has maintained more or less intensive anti-rat operations for nearly half a century, but only on ships has it accomplished any sustained freedom from these dangerous pests. It would appear that we may hardly expect to place them under general control until we fully recognize them as constant and dangerous public health enemies, and place their eradication on the same footing as any other regular endeavor of the health department. In view of the long list of rat-borne diseases, constantly being augmented, it would surely seem we have already too long delayed.

The rat control division of the health department should not engage in actual rat eradication, any more than sanitary inspectors actually install the necessary sanitary apparatus in restaurants or milk sanitarians ac-

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BUYING PEST CONTROL INSURANCE, LIKE PERFORMING A FUMIGATION, HAS MANY HAZARDS, AND SHOULD ONLY BE ENTRUSTED TO THE EXPERT

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tually operate dairies. It should be staffed with experts competent to determine by inspection when premises are rat infested, to point out the signs of infestation and the harborages to owners and tenants, and to advise as to proper methods of eradication. The property owner or tenant should be required to maintain the premises free of rats just as he is required to abate any other sanitary violation. When we learn to couple constant sustained rat eradication with adequate control of garbage we may have some reasonable hope of controlling the rat-borne diseases.

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*Dr. Williams wishes to extend credit to Doctor Meleney for use of his paper, "Recent Extension of Endemic Typhus Fever in the Southern United States," published in American Journal of Public Health, Vol. 31, No. 3, March, 1941.—EDITOR.

Typhus Scourges Athens

Berne, Switzerland, Sunday, June 28—An outbreak of typhus was officially reported tonight from Athens, where many cases have been found in several public hospitals.

Local authorities, aided by German Sanitary Corps, have closed all public buildings, restaurants and theatres and have set up delousing centers in an attempt to stem the epidemic. It is understood here, according to this report, that the local authorities are taking a serious view of the general run-down condition of the Greek population.

—*N. Y. Times.*

Mole Control

By Ernest M. Mills

The control of moles presents a difficult problem, and no easy method has been found to get rid of them. Experience has shown that poisoning is unsuccessful. These insectivores will not take substitutes for the living worms and insect larvae. Recently the Fish and Wildlife Service conducted a series of tests with all known commercial baits for moles, feeding these baits to caged moles. None of these commercial baits tested were eaten in sufficient quantity to cause the death of any moles.

Gases of various kinds introduced into their runways are generally ineffective. One of the difficulties is that the operator is unable to force or place the gas throughout the entire length of the mole's runway, which often extends into hedge rows, under stone walls, under shrubbery or into inaccessible places. Under certain conditions gases may destroy moles or cause them to avoid the gassed area.

The only effective method to control moles is by the use of traps. Even with the special mole traps, it requires skillful and patient labor to attain success.

(Excerpted from Ernest M. Mill's article of "Moles in Lawns and Hedges Destroyed by Use of Traps." N. Y. Times, 5-31-42.)

Quotation for the Month

Much more wisdom is learned from failure than from success.

Ceiling to Bet Set on Cresylic Acid Resales

Price Administrator Henderson July 8 informed importers of English cresylic acid that a price regulation governing the price at which they may resell this product will be announced in the near future.

"Both British and American authorities regard the substantial increases which have taken place in the price of imported cresylic acid since April, 1941, as unjustifiable and negotiations are now under way to determine a more satisfactory price," he declared.

Cresylic prices, he explained, have been stabilized in Great Britain since May 1, 1942, for domestic sales. The contemplated maximum prices for sales of imported cresylic will be based on a price of 4s. 2d. per imperial gallons ($70 per U. S. gallon) f. o. b. English works, which approximates the English domestic price, he said.

Boys Build "Better Mouse Trap"

A Pasadena, Calif., newspaper recently carried a photo of three members of the Pasadena Boys' Club and the rat trap with which they caught 105 rats, for which two of them received cash prizes, the third a wrist watch. The trap was built by club members who rid Pasadena of several hundred rodents during the anti-rodent drive, conducted by the City Health Department and the Junior Chamber of Commerce. The names of the prize winners were Gus Rodstrom, Ysidro Huerta and Joe Zarapiello.

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WHAT'S NEW IN PEST CONTROL-PERSONALS

Wedding Bells Peal Twice for Mrs. Wilbur Francis Smith's Daughters: That California's native "sons" never do anything by halves is exemplified by the June marriages of Elizabeth Anne and Jean Elberta, daughters of Clara Smith and the late Wilbur F. Smith, to Lieutenant Henry Lorenzo Downey and Mr. John Richard Robertson, respectively, the marriages taking place in Pasadena, Calif., and Yuma, Ariz. Congratulations and the best of everything to Clara, her attractive daughters and her sons-in-law.

George R. Elliott Becomes an Uncle: Mrs. Cook, the wife of Ken, who is associated with George in the Ransford Insecticide Co., Worcester, Mass., became the mother of a son, early the morning of July 16. George reports that the boy seems to have the makings of a worthy PCO, and that father and uncle are doing fine, too. With such a fine heritage the new arrival will no doubt more than live up to his advance billing. Congratulations and good wishes.

Jean Wilson Houghton Makes "Debut" . . . Weighing 7 lbs. 2 oz.—not bad for a junior miss—and arriving in the wee hours of June 26, Jean Wilson became a member in good standing of the family of Charles and Louise Houghton. Charlie is with the Safety Fumigant Co., Boston, Mass. No doubt Jean's early morning proclivities will be checkmated by her parents until a more appropriate time. Congratulations, Charlie, Louise and Jean, and may you always have and know the best of everything.

Sumptin's Cookin': Billy Buettner recently left for Columbus, Ohio, to join Jim Steckel, to spend part of his vacation. While passing through Pittsburgh, en route to Columbus, Billy was taken in tow by the Lou Gattos and Lloyd Crosbys. We don't know exactly what's cookin' but it looks maybe as if the two ex-presidents were getting their sons primed early to start a rival concern, or perhaps to take over. Could be!

RAT GHOST: Tar or whitewash a rat and its former companions run in terror.

A. B. Weingard Heads Continental Oil Co.: Vice-president, and with the Pennsylvania Refining Co., Butler, Pa., for 20 years, Mr. Weingard recently resigned from that post to join the Continental Oil Co., Oil City, Pa., producers of petroleum products.

A surprise 'phone call about ridding rats turned out to be three (Rose) two legged rodents.

Norman C. Dold, Al Akers and Harlem B. Ives of the Rose Exterminator Co. passing through Kansas City on a business trip to the west coast to see Mr. Rose, were the callers.

Sorry that they could not spend time to have a real chat.

Rodent and Insect Control to be Studied in Food Sanitation Course: In co-operation with the Department of Health, City College, N. Y. C., is offering an eight-week course this summer in food sanitation and storage, it was announced recently by Profesor Robert Jahrling, director of the division of public service training, which is giving the course. The course is designed for food dealers who will come under stricter supervision of the Board of Health, beginning October 1. The course started July 7 and will extend to August 25 at the School of Business Building, Lexington Avenue and 23rd St., N. Y. Rodent and Insect Control will be included amongst the subjects covered.

Rock Wool Insulation—I would like to insulate my house by blowing rock wool between the walls. Would the wool compact enough to get and keep damp, causing the sheathing and laths to rot?

Propertly installed rock wool will not pack down. Unless the air in the house contains excessive amounts of moisture, insulation will not become wet or damp.

—From Roger B. Whitman's Column, N. Y. Sun.

Oversleeping will never make your dreams come true.

Abstract of Addresses

(Continued from Page 20)

was from Europe and the Orient. This supply has been entirely cut off. The outlook for growing insecticidal plants in Central and South America appears especially bright.

Pyrethrum flowers of which the U. S. imported 20 million pounds in 1937 would grow well in the high plateaus of Mexico. At present almost the entire world production is grown in eastern Africa. Advantage should be taken of the opportunity to produce in the America insecticides which must now be transported half round the world.

Mr. Roark pointed out that raw materials used in the manufacture of insecticides come from many of the American Republics: copper from Chile, arsenic and antimony from Mexico, sulphur and florine from U. S., cube from Peru, timbo from Brazil, barbasco from Venezuela, and nicotine from U. S. No one country is self-sufficient in materials for combating the numerous animal and plant pests that affect agriculture and only by a free interchange of raw materials among the American nations is it possible to carry on the fight.

"Nations Urged to Join Hands in Control of Insect Pests"

Dr. P. N. Annand, Chief, Bureau of Entomology and Plant Quarantine, U. S. Dept. of Agriculture.

Man-made barriers are no barriers to insects and political boundary lines are easily crossed by crop pests. Because of this fact, pests native to one country have often become serious problems in widely separate nations.

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MEMBER NATIONAL PEST CONTROL ASSOCIATION

Dr. Annand cited the series of insects introduced from abroad to the countries of the Western Hemisphere. A coordinated effort can do much to control these pests, he said.

Dr. Annand pointed out that there are probably more than 6 million kinds of insects in the world, and 13 of these in five or more American Republics annually cost the people over $6,000,000. This is but a fraction of the total cost of $2,000,000,000 annually. International surveys in locating important pests would be of great value.

Crickets Invade Homes on L. I.

North Patchogue, L. I.—Dr. Arthur T. Davis, Suffolk County Health Commissioner, is investigating the invasion of twenty homes in a small development here by the gryllus domesticus, or European house cricket. The crickets have swarmed into the houses by the thousands, chewing up possessions varying from curtains to suits of clothing.

Alarmed householders finally lodged a complaint with the Brookhaven town board.

Nicholas Giangotta of Lincoln Rd. exhibited a hat from which the hatband had been gnawed away in 15 minutes. Leroy Hulse of Maple Ave. appeared in coat and trousers that did not match. He explained that the companion parts of the suits had been eaten away, forcing him to use the combination.

—*N. Y. World-Telegram.*

Don't Go, Miss Muffett!

Because the spyglass industry needs crosshairs for bomb and gun sights, telescopes and microscopes, an enterprising professor has a 200-spider "ranch" for fine spider silk used in these instruments, says the magazine "Flying." Ordinary silks and hair are too coarse or won't do for other reasons.

The spiders are "milked" of their webbing material, which is wound in 100-foot reels that sell for $9. During the process a spider's hind legs are harnessed so the insect cannot cut its "production." Want to help, Miss Muffet?

—*N. Y. Times.*

LOCAL ORGANIZATION NEWS

More Than Forty Attend Important Joint Session

New York Pest Control Association and Professional Exterminators Association, Hotel Commodore, N. Y., July 1st.

With business hobbling along on a day to day basis because of the steady stream of inhibitory rulings emanating from Washington, the forty or more PCOs who attended the joint meeting of the N.Y.P.C.A. and the P.E.A. on July 1st, in New York, were amply repaid for the time invested. The timely subjects, below indicated, were given a thorough airing, with many questions answered, all of which no doubt helped clarify many of the war-time posers confronting the operators.

1. Pyrethrum "freezing" Order and its relationship to our operations in N.Y.C.

2. Price Ceiling Regulation or, as it is referred to, "Maximum Price Regulation No. 165—Consumer Service."

3. Priorities in General.

4. Employee Situation.

5. Priorities Regulation No. 10 and the Allocation Classification System.

6. Rubber (Tires, Tubes, Recaps).

7. Gasoline.

8. Public Relations Program.

St. Louis Pest Control Operators

The July meeting of the St. Louis Pest Control Operators was held Tuesday evening, July 7th, at the York Hotel. The men met for dinner in the Coffee Shop at 6:30 P. M.; the meeting was called to order by President Exner. Minutes of the previous meeting were read and approved, and financial report read by the secretary. Mr. W. E. Martin reported as chairman of a committee which submitted recommendations for changes in our constitution and by-laws. One of the changes in the constitution and by-laws was the creation of a class of membership to be known as "associate member." Operators who are just starting in business will be under this classification of membership. After one year as an associate member, if his general conduct and business practices are acceptable, he may then be voted to become a member of the association.

This meeting brought to a climax a drive for members in the National Association. Five members were brought in which now makes our local association represented one hundred per cent as members of the National Association. Those in attendance were:

Mr. F. Maly, Maly Bros. Termite Control Co.; Mr. Louis C. Traband, Louis C. Traband Co.; Mr. H. H. Cassilly, City Fumigating Co,; Mr. H. J. Bromfield, Reliable Exterminators; Mr. W. E. Martin, Bug Death Products Co.; Mr. Thos. C. Raley, Getz Exterminators; Mr. Emil Ganter, Home Reconditioning Co.; Mr. Roy McCullough, Modern Fumigating Co.; Mr. L. H. Fleming, St. Louis Exterminator Service Co.; Mr. Wm. F. Exner, Termite Control Co.; Mr. Chas. Denny, Charles Denny & Co.

The next meeting will be held on August 4th at the home of Mr. Louis C. Traband who will entertain the members with an old-fashioned barbecue.

Indiana PCOs Discuss Priorities

The regular bi-monthly meeting of the Indiana Pest Control Operators' Association was held at Purdue University, Lafayette, Indiana, July 18, with the following in attendance: A. D. Bosley, I. C. Brooks, J. J. Davis, E. E. Edwards, J. R. Franklin, W. S. Gibson, G. E. Gould, K. F. Hannum, H. B. Jordan, G. E. Lehker, Mr. and Mrs. Bert Lewis, G. W. Reuter, and E. Richman.

F. E. Merritt of the Purdue Chemistry Department discussed priority ratings and priority procedures. In the afternoon the program included mosquito identification by I. C. Brooks, methods of testing mosquito repellents by E. Richman, and economic importance and control of mosquitos by J. J. Davis. B. E. Montgomery discussed the importance of body lice and their control.

The Association voted to take a full page in the program of the forthcoming PCO Convention to be held in Pittsburgh.

For the first time the new officers for the coming year presided, Bert Lewis as President and E. E. Edwards as Secretary-Treasurer.

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Legislation Relating to Rodents

(Continued from page 9)

means of entry for rats, with concrete, sheet iron, hardware cloth or other types of rat-proofing material approved by the Commissioner of Health.

Rat Harborage shall mean any place where rats can live and nest without fear of frequent molestation or disturbance.

Hardware cloth shall mean wire screening of such thickness and spacing as to afford reasonable protection against the entrance of rats and mice.

Section 80-49. Elimination of Rat Harborages. Whenever accumulations of rubbish, boxes, lumber, scrap metal, car bodies, or any other materials provide rat harborage, the person, firm or corporation owning or in control of such materials shall cause the materials to be removed or the materials shall be stored so as to eliminate the rat harborage. Lumber boxes and similar materials shall be neatly piled. These piles shall be raised at least a foot above the ground. When the owner of the materials cannot be found, after reasonable search, the owner or manager of the premises on which the materials are stored shall be responsible for disposal, or proper piling, of the materials.

Section 80-50. Elimination of Rat Feeding Places. No person, firm or corporation shall place, or allow to accumulate, any materials that may serve as a food for rats in a site accessible to rats. Any waste material that may serve as food for rats shall be stored in rat-proof containers. Feed for birds shall be placed on raised platforms or such feed shall be placed where it is not accessible to rats.

Section 80-51. Extermination. Whenever rat holes, burrows, or other evidences of rat infestation are found on any premises or in any building within the city, it shall be the duty of the owner or manager of such property to exterminate the rats or to cause the rats to be exterminated. Within ten days after extermination, the owner or manager shall cause all of the rat holes or burrows in the ground to be filled with earth, ashes or other suitable material.

Section 80-52. Rat-Proofing. It shall be the duty of the owner or manager of any building in the City of Milwaukee to make such building reasonably rat-proof, to replace broken basement windows, and when necessary to cover the basement window openings with hardware cloth or other suitable material for preventing rats from entering the building through such window openings.

The owner or manager of any premises upon which sheds, barns, coops or similar buildings are located shall eliminate the rat harborages from within and under such buildings by rat-proofing, raising the buildings above the ground, or by some other suitable method; or such sheds, barns, coops or other buildings shall be razed.

Section 80-53. Penalty. Any person, firm or corporation who shall fail to comply with any of the provisions of this ordinance shall be punished by a fine of not less than five dollars nor more than fifty dollars for each and every offense, and in default of payment thereof shall be imprisoned in the county jail or house of correction of Milwaukee County until such fine and costs are paid, such imprisonment not to exceed fifteen days.

Part 2. All ordinances or parts of ordinances contravening the provisions of this ordinance are hereby repealed.

Part 3. This ordinance shall take effect and be in force from and after its passage and publication.

Passed May 18, 1942."

RAT PROOFING

In our previous quotation of the Milwaukee, Wisconsin ordinance, it will be observed that much of the ordinance had to do with rat proofing. It is preferable to provide the complete text of the Milwaukee ordinance rather than divide the phraseology. Continuing, however, with specific references to rat proofing, we submit the following:

During the outbreak of plague in the southwest around 1918-1921 several cities passed ordinances of which Galveston, Texas and Beaumont, Texas are typical examples. These ordinances are quite lengthy giving considerable details as to techniques of proofing work itself including specifications. These comprehensive ordinances attempt to cover the complete program of rat proofing in all manner of buildings, outhouses and superstructures.

1—Galveston, Texas. Only a few sections of the Galveston ordinance are quoted. The introduction to this ordinance explains the comprehensive nature of the Rat Proofing program.

"AN ORDINANCE amending an ordinance enacted by the board of commissioners of the city of Galveston on the 8th day of Sept., 1920, entitled, 'An ordinance amending an ordinance enacted by the board of commissioners of the city of Galveston on the 8th day of July, 1920, entitled, An ordinance to better protect the public health, and particularly to prevent the introduction and spread of bubonic plague by providing for the rat-proofing of all buildings, outhouses and other super-structures, stables, lots, open areas and other premises, sidewalks, streets and alleys in the city of Galveston, and providing a penalty for the violation thereof.' "

Section 2—"That it shall be unlawful for any person, firm or corporation to have or maintain, or hereafter to construct, any building, outhouse or other super-structure, stable, lot, open area or other premises, sidewalk, street or alley within the city of Galveston unless the same shall be rat-proofed in the manner hereinafter provided."

Section 3—"That for the purpose of rat-proofing, all buildings, outhouses and other superstructures in the city of Galveston, except stables, shall be divided into two classes, to-wit: Class "A" and Class "B" and the same shall be rat-proofed in the manner following, to-wit:

Class "A"—All buildings, outhouses and other super-structures of Class A shall have floors made of concrete, which concrete shall not be less than three (3) inches thick and overlaid with a top dressing of cement, mosaic tiling, or other impermeable material laid in cement mortar and such floors shall rest, without any intervening space between, upon the ground or upon filling of clean earth, sand, cinders, broken stone or brick, gravel or similar material, which filling shall be free from animal or vegetable substances; when desired, the top covering of cement, mosaic tiling, etc., may be eliminated provided the concrete flooring be made three and one-half (3½) inches thick and the surface of same pooled so that it will be perfectly smooth; said floor shall extend and be hermetically sealed to the walls surrounding said floor, which walls shall be made of concrete, stone, brick laid in cement mortar, and each wall shall be not less than six (6) inches thick and shall extend into and below the surface of the surrounding ground at least two (2) feet and shall extend not less than one (1) foot above the surface of said floor. When so desired, wooden removable gratings may be laid upon the surface of said concrete floors provided no intervening space exists between them, provided, that a wooden floor may be super-imposed upon a floor of concrete, if no intervening space exists between them, and the sleepers shall be creosoted timbers and completely embedded in the concrete floor without intervening space, except at those points where the wooden flooring will be fastened to them.

Class "B"—All buildings, outhouses and other super-structures of Class "B" shall be set upon pillars or underpinning of solid wood, or concrete, stone or brick laid in cement mortar, such pillars or underpinning to be not less than eighteen (18) inches high for a building thirty (30) feet or less in width, for buildings over thirty (30) feet in

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width, the minimum height must be at least six (6) inches or greater for each additional ten (10) feet of width over thirty (30) feet; the height to be measured from the ground level to the top of said pillars, or underpinning; and the intervening spaces between said building and ground level to be open on three sides and to be free from all rubbish and other rat-harboring materials; or, at the discretion of the owner, may be made rat-proof by constructing at the margin of the ground area of said building a wall of concrete, or brick or stone, laid in cement mortar, such wall to extend into and below the surface of the ground at least two feet and to meet the floor of the building above closely and without any intervening space. Such walls shall be at least six (6) inches thick and extend entirely around said building; provided, that said walls may be built with openings therein for ventilation only, and provided further that such openings for ventilation may be of such size as the owner may elect and shall be securely screened with metallic gratings, having openings between the bars of said gratings of not more than one-half (½) inch, or with wire mesh of not less than one-half (½) inch and the whole so constructed and closed as to prevent the entrance of rats beneath such buildings."

Section 4 — "That every restaurant kitchen, cabaret kitchen, dairy, dairy depot, wharf, pier, elevator, store, manufacturoy and every other building, outhouse or superstructure, wherein or whereon foodstuffs are stored, kept, handled, sold, held or offered for sale, manufactured, prepared for market or for sale, except stables, shall be rat-proofed in the manner provided for hereinabove as of Class "A."

(We have omitted five subsections of Section 4, and Sections 5 to 18 inclusive.)

2—Portland, Oregon, Ordinance No. 33986, Article VIII. (We quote only the three paragraphs referring to rat-proofing.)

Section 7. "RATS—PROTECTION FROM. It shall be unlawful to keep or store, or expose any for sale, or to keep or store for any purpose whatsoever, any food products or any goods, wares or merchandise of whatever kind or nature, or to keep, maintain, occupy or reside in any building, store room, grain elevator, warehouse or residence in the City of Portland without complying with the regulations herein provided for the protection of food products and other goods, wares and merchandise from invasion and contamination by rats.

(a) All buildings and the basements thereof used as a storeroom, grain elevator, warehouse or other building where food, hides, or other supplies offering support or harborage for rats, are stored or kept for sale, shall be so protected by the use of screens, netting, cement or other materials approved by the Bureau of Health as to prevent rats from gaining entrance into such building, and all food products, or other supplies, goods, wares or merchandise, whether kept for sale or for any other purpose, shall be protected as to prevent rats from gaining access thereto, or coming in contact with.

(b) All public and private docks shall be protected by wire screens of netting, or other material or materials approved by the Bureau of Health, and so installed as to prevent rats from gaining entrance to such docks at either high or low tide from vessels anchored or moored alongside of such docks, or from other sources and all food products stored on docks shall be kept and stored as to prevent rats from gaining access thereto or coming in contact therewith.

(c) All packing houses of every kind and nature shall be so protected by wire screens or netting, or cement, as to prevent rats from gaining access to the building or buildings thereof, and all holes and openings in the building or basement walls shall be thoroughly stopped with cement or other approved material, and all food products stored in packing houses shall be so kept as to prevent rats from coming in contact therewith."

3—Tacoma, Washington — Ordinance No. 9904: There are 15 sections to this ordinance. The Department of Health is the enforcing agency. Provisions are made for rat proofing or blocking out of rats. Emphasis is given to water front areas, although included are all manner of buildings including private residences. Penalties are provided making violators guilty of a misdemeanor and upon conviction shall be fined in any sum not exceeding $300.00, or imprisoned in city jail for a term not exceeding ninety days, or both, in the discretion of the court.

To quote a few of the salient sections:

a) "It shall be unlawful for any person to keep, store, or expose for sale any food products or other goods, or to occupy or maintain any dock, building, store room, or warehouse or to reside in any residence without complying with the provisions of this ordinance." (Section 1.)

b) "All basements and walls of all buildings, store rooms, warehouses and residences within the city shall be so constructed or repaired by the use of screens, nettings, cement or other material or materials approved by the Director of Health as to prevent rats from gaining entrance to or harboring beneath the same." (Section 2.)

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c) "All docks, buildings, store rooms, warehouses and residences within the city shall be forthwith placed in a clean and sanitary condition and rendered free from rats. It shall be the duty of the owner, lessee or occupant thereof to take care of all necessary steps to that end." (Section 3.)

d) "All food products or other goods, whether kept for sale or for any other purpose, shall be protected as to prevent rats from gaining access thereto or coming in contact therewith." (Section 5.)

e) Sections 6-7-8-9—These take up provisions with regard to water craft.

4—Excerpt from the Building Code of Baltimore City, 1941. Section 294—RAT-PROOFING.

"Par. 2940. Any and all buildings or other structures, and any and all portions thereof, hereinafter erected, constructed, reconstructed or altered, shall be made ratproof, and in connection therewith the provisions of Section 294 of this Code and all other applicable provisions of this Code shall be complied with.

"Par. 2942. All ground floors of all buildings shall be completely covered with a concrete slab not less than 3 inches thick or other similar rat-proof material.

"Par. 2943. All cellar windows and other similar openings less than two feet from ground shall be protected with a screen of rat proof material. Provided, however, that in dwellings two stories or less in height and not over 2,000 square ft. in area, ordinary fly screens may be used in lieu of screens of rat proof material.

"Par. 2944. All holes in floors, walls or partitions of buildings or other structures through which rats may have access shall be completely closed with rat-proof material or otherwise protected so that it will be impossible for rats to get through.

"Par. 2954. Plain and reinforced concrete, all brick, tile, concrete blocks or cut stone masonry laid with joints not exceeding 5/8 inch in thickness; all smooth sheet metal work; tin with seams bent downward; cement or gypsum plaster on metal lathe; wire glass in metal frames; all metal clad doors and windows; No. 10 gauge wire grills with one-half inch mesh or less and other similar construction through which rats cannot gnaw or force their way, or on which they cannot get a foothold; shall be considered ratproof construction.

"Par. 2948. Accessory buildings and other similar buildings or structures shall be erected or constructed as required in Sections of Chapter 49 of this Code.

"Par. 2949. Violations of the requirements of this section constitute health violations and are subject to the penalties prescribed in Paragraph 1923 of this Code."

5—Los Angeles, California: In 1939 from mimeographed Bulletin No. 43 entitled "The History of Rodent Control Division of Los Angeles City," reference is made to a proposed Rat Proofing Ordinance but our files do not indicate that this ordinance was passed. A few of the paragraphs of what was then a proposal read:

a) Section I. "That every building or other super-structure of any and every character whatsoever used as a food depot in the City of Los Angeles shall be rat and rodent proofed in the manner hereinafter provided."

b) Section II. "That the construction and material used in rat proofing shall conform to the building ordinance of the City of Los Angeles."

c) Section III. "It shall be unlawful for any person to maintain or construct any building or super-structure within the corporate limits of the City of Los Angeles, used or to be used as a food depot unless the same shall be rat and rodent proofed as hereinafter provided."

d) Section VI. "The ground floor of every food depot or super-structure used as a food depot shall be of concrete, which concrete shall not be less than three (3) inches thick and overlaid with a top dressing of cement, mosaic, tiling or other impermeable material, not less than one-half (½) inch in thickness, and such floor shall rest upon the ground without any intervening space between said floor shall extend and be hermetically sealed to walls surrounding said floor, which walls shall be of concrete, or of stone or brick laid in cement mortar, and each wall shall extend into and below the surface of the surrounding ground not less than eighteen (18) inches, each wall shall be in thickness as required by the building ordinance as it relates to the several types of buildings, provided, however, that any building or super-structure used as a food depot having a basement therein provided with a concrete floor and walls meeting the above requirements may have floor of wood or other material."

e) Section VII. "Every opening more than one-half (½) inch in width, extending through any exterior wall, or extending through any floor or ceiling, or providing access to a hollow and unused space in any exterior wall, interior partition, floor, ceiling or attic, shall be rat and rodent protected, as hereinafter provided in this section; every such vent and ventilating opening, fronts or entrances, in any exterior wall shall be protected in an approved manner by wire mesh made of not less than number eighteen (18) gauge galvanized wire with no opening in such mesh more than one-half (½) inch in width, or shall be protected in some equivalent manner.

Fronts or entrances shall be permanently attached to building with no opening over one-half (½) inch and with not more than one-quarter (¼) inch clearance at top and bottom when closed.

Every pipe, duct, or vent extending into or through any wall, partition, floor or ceiling, shall be provided with a suitable metal collar or flashing at every place where it enters into and/or extends out of such wall, partition, floor or ceiling, except when as otherwise hereinafter provided in this section.

The provisions of this section shall not apply where any such pipe, duct or vent extends into or through masonry or metal, in case the space around such pipe does not extend over one-half (½) inch in width at any point. Every building and structure and every portion thereof required to be rat and rodent protected by the provisions of this ordinance shall be kept and maintained in such a condition that the same shall always comply with the provisions of this ordinance. Any persons who, at the time of making any repairs or alterations, shall make any changes or modify the provisions of this ordinance shall be guilty of a misdemeanor and shall be prosecuted.

The provisions of this ordinance shall not be deemed or construed to, in any way, change the provisions of any existing ordinances, except insofar as the provisions of this section provide for additional requirements."

Other references to Rat Proofing:

1. "Anti-rat Ordinances of San Francisco, California; Oakland, California; and Seattle, Washington."—Reprint from Public Health Reports No. 91 (Public Health Reports Vol. XXVII, No. 33, August 16, 1912 and Public Health Reports XXVII, No. 34, August 23, 1912.)

2. Beaumont, Texas. An Ordinance, July 13, 120 and amended June 13, 122.

3. City of Lakewood, Ohio, 1942. An ordinance which embodies in part the element of rat proofing.

4. Rat proofing regulations are frequently included in building codes, not necessarily referring to rodents but obviously should be construed as having the effect of rodent control when emphasis calls for such construction as fire stops, specified clearance spaces under the structures, etc.

5. Educational literature such as Conservation Bulletin No. 19, Fish and Wildlife Service, U. S. Department of The Interior, entitled "Rat Proofing — Buildings and Premises," and the Georgia State Department of Health Bulletin entitled "Murine Typhus Fever" (Vent stoppage) include sections on rat proofing.

6. Supplement No. 93 to The Public Health

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Reports, U. S. Public Health Service, entitled "The Rat Proofing of Vessels."

7. Supplement No. 131 to The Public Health Reports, U. S. Public Health Service, entitled "The Rat and Ratproof Construction of Buildings."

8. Supplement No. 151 to The Public Health Reports, U. S. Public Health Service, entitled "Ratproofing of New Ships."

MISCELLANEOUS

1—**Indiana Acts of 1913** provides in Section 8247 (7648n) a "Rat Day." "The governor may annually, in the spring, designate by official proclamation a day to be designated as "rat day," to be observed throughout the State as a day for exterminating and destroying rats about the homes and premises and public buildings and all other places, thus preventing the dissemination of disease and the destruction of property."

2—**District of Columbia:** January 19, 1942, Article XXXII of the Police Regulations under the title of "Rodent Control" was amended to read:

a) Amended at the end of Section 1, "In the event of the proposed demolition, moving or removing, in whole or in part, of any building or structure, a certificate shall be obtained from the Health Officer stating that proper measures have been taken for the eradication and prevention of spread of rodents from the premises, before the permit to demolish or remove the building, or part is issued. In the event of the demolition or removal of a building, or part, by order of the Inspector of Buildings, the eradication of rodents will be done by and certified to by the Health Officer, within the time specified in such order."

It will be noted that this article has omitted laws and regulations pertaining to the labelling and distribution of control products, use or non-use of certain control materials, and licensing of fumigators and pest control operators. It is hoped that these laws and regulations will be assembled within a short time for a succeeding article.

Acknowledgments are made for the grateful assistance of Mr. George B. Lay of the U. S. Fish and Wildlife Service for suggestions in the organization of this material and Mr. William O. Buettner of the National Pest Control Association for supplying the texts of some of the laws and regulations.

"With the Colors"

LeRoy Weisburger reported in June Pests as being stationed at Great Lakes, Ill., Naval Training Station, has been transferred to Naval Training School (Radio), Section R, University of Wisconsin, Madison, Wis. Before Mr. Weisburger entered the service, he was with the firm of B. & D. A. Weisburger, New York pest control insurance specialists.

W. E. McCauley, or "Mac," as he is more familiarly known to his host of friends in the Pest Control Industry, and manager of the Insecticide Division, Velsicol Corp., has been commissioned a first lieutenant, and assigned to the "Amphibian Command" at Camp Edwards, Mass. "Mac" hopes for a transfer to the Sanitary Corps where his civilian training and experience should prove of even greater service in the war effort. Drop "Mac" a line: 1st Lieut. W. E. McCauley, 362nd Qm. Bn. E.A.C., U. S. Army, Camp Edwards, Mass.

Cady S. Corl has been commissioned a captain in the U. S. A., and is stationed at Huntsville Arsenal, Huntsville, Ala. Mr. Corl was formerly with Allaire, Woodward & Co., Peoria, Ill.

Bob Davis, son of Prof. J. J. and Mrs. Davis, has passed his physical examination and is now an aviation cadet at Kelly Field, Texas. His well-known parents are justifiably proud of Bob's accomplishment, who is happy about the whole thing himself, except for one thing: his arm has developed a kink saluting so many officers, causing him to "S.O.S." J.J. for an ample supply of liniment. For those who want to write: Av. C. Robert M. Davis, Flight A — Group 3 — Squadron No. 2, Air Force Pre-Flight School (Pilot), Kelly Field, San Antonio, Texas.

As we go to press word comes that Harold E. Jennings of Chicago, Ill., has received his commission as Lieutenant Senior Grade, U. S. Navy. For the duration the Smithereen Company of Chicago, will be supervised by Mr. Wicker, long associated with the Smithereen Company.

G. Marion Stover, Vice-President of the B. B. Exterminators, Inc., Baltimore, Md., has been in service for 1½ years and his address is Captain Geo. Marion Stover, 224th F. A. Bn., A. P. O. No. 29, Delworth, North Carolina.

Transmittal of Syphilis by Spider or Bedbug?

"I wish to know," writes a reader of "Hygeia" to its editor, "whether a spider or bedbug can carry the syphilis germ. For instance, if a person having spyhilis was bitten by a bedbug or spider, which later bit another person, could he get the syphilis germ through the bite. If so, how soon would you advise a blood test?"

To which the editor replied, as follows: "So far as is known, no insect can carry the germ of syphilis in its body and transfer it to a human being by a bite or sting, as occurs in the case of the mosquito in malaria and yellow fever, or in the case of the louse and typhus fever. Theoretically, it is possible for the germ of syphilis to get on the feet of an insect, be transferred to the human skin, but it is doubtful if this ever has happened, because the germ of syphilis lives but a few minutes outside the human body. It is dead as soon as it becomes dry. Whenever, there is any suspicion of infection with syphilis, the blood does not become positive for two or three weeks. Therefore, the blood should not be tested in less than that time."

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Please note, however, that you must request each booklet on a separate letterhead though they may all be mailed in one envelope addressed to Pests, 126 Lexington Avenue, New York City, N. Y.

ANTIDOTE KITS

With the increased use of certain poisons in the control of predatory animals, rodents, and insects, more and more accidental poison cases are bound to occur. Studies of these poisons have led to the development, for each poison, of an antidote which is, we understand, in itself, harmless, but may be effective in the hands of a layman rendering first aid to a poisoned person or animal, before the services of a doctor can be secured. Antidotes conveniently packed for kit use are now available for the following poisons: Barium Carbonate Antidote, for human or animal; Phosphorous Antidote, for human or animal; Thallium Antidote, for human or animal; Arsenic Antidote, for human or animal; Strychnine Antidote, for human; Strychnine Antidote, for dog; Strychnine Antidote, for horse; Fluoride and Fluosilicate, for human. Literature giving fuller particulars and prices on request.

WRITE PESTS—Jayne.

INSURING FUMIGATION RESULTS

Bulletin advances some valuable suggestions which should prove of constructive interest for the fumigator.

WRITE PESTS—AC60.

INSECTICIDES FOR PEST CONTROL INDUSTRY

Price list covers ant paste, silverfish paste, mothproofing concentrate, termite control chemical, powder post beetle solution. This same concern also issues circular which discusses the question of termite control.

WRITE PESTS—Chec.

DRY SODIUM ARSENITE

Circular descriptive of its use for Grasshopper Bait, Weed Killer, Mormon Cricket Dust, Tree Killer, Termite Control, Wood Preservative. Method of treating foundation timbers and treatment of infested timbers. FREE COPY MAY BE HAD BY ADDRESSING CHIPMAN, c/o PESTS.

CURRENT TOPICS:

Circular which discusses How Defense Plans Affect Your Business, The Pyrethrum Situation, and also Price List of Pest Control Chemicals. Write PESTS—York.

SOLVAY PRODUCTS

48-page booklet in colors and illustrated, covering their entire line of Alkalies and Special Products, with a special section dealing with Para-Dichlorobenzene and Ortho-Dichlorobenzene.

FREE COPY MAY BE HAD BY PEST CONTROL OPERATORS. WRITE SOLVAY, c/o PESTS.

NEW INSECTICIDE CONCENTRATE FOR CONTACT SPRAYS:

Bulletin describes concentrate, which is a derivative of the southern pine, which assures a dependable supply, and which is the thiocyanoacetate of a secondary terpene alcohol. It also gives results of the Peet-Grady tests of "Thanite" sprays in comparison with the official test insecticide. Laboratory and field tests, the bulletin further states, established that the material has knockdown and killing properties against flies, bedbugs, mosquitoes, roaches, moths, ants, mites, silver fish, centipedes, and spiders, and repellent properties in livestock sprays.

WRITE PESTS—"Thanite".

RAT CONTROL AND THE WAR

Circular discusses the importance of adequate rat control to further the war effort.

WRITE PESTS—AC.

FLEA-KILLER

Descriptive circular of insecticide for fleas, lice, ticks on dogs and cats. Small package line for over the counter sale to your customers. Profit possibilities discussed.

WRITE PESTS—J-O.

DESCRIPTIVE PRICE BOOK SANITARY CHEMICALS

Available only to bona fide wholesalers, jobbers of sanitary supplies, insecticides and PCOs who carry a line of sanitary chemicals. Includes disinfectants, soaps, fly sprays, deodorant blocks, etc.

Write PESTS—Good.

Entomology and Warfare

"A young friend of mine, a keen student of insects, has recently been taken over by the military authorities as an entomologist. He does not know where he will be sent or did not when I talked with him, but he has a keen sense of the possibilities of such a position, and is very enthusiastic about it. Years ago, I met Sir David Bruce in Maderia, and he commented on the great opportunities for work connected with the transmission of disease in the tropics and the unwillingness or inability of most resident medical officers to take up this work, in addition to their regular duties. If our military authorities are now establishing entomological units, with trained workers, in all the places where our troops are stationed in the tropics, the results will certainly be of great importance. Sickness and death will be prevented, and information will be obtained which will be of value in times of peace."

—*From Science*, 3-29-42.

Entomological Literature

CHEMICAL ANALYSIS OF ROTENONE

Howard A. Jones, Division of Insecticide Investigations, has written an 80 page book reviewing methods for the chemical analysis of rotenone-bearing plants, which was published by the Bureau of Entomology, U. S. Department of Agriculture, Washington, D. C.

MEAT AND ANIMAL PRODUCT INSECTS—Insects in Relation to National Defense—Circular 5, U. S. Department of Agriculture, Bureau of Entomology and Plant Quarantine, Washington, D. C. June, 1942.

TABLE OF CONTENTS: Principal pests: Ham Skipper, Ham Beetle, Larder Beetles, Ham or Cheese Mites. . . . CONTROL: Cold Storages, Heat and Steam, Screened Storage, Wrapping Meats, Fumigation, Trimming, etc.

TICKS—Insects in Relation to National Defense—Circular 12, U. S. Dept. of Agriculture, Bureau of Entomology and Plant Quarantine, Washington, D. C. April, 1942.

TABLE OF CONTENTS: Kind of Ticks: Life Histories and Habits; How to Avoid Tick Attack and Infection: Precaution Against Tick Bites; How to Reduce the Danger of Disease: Infection by Tick Bites; Control of Wood Ticks; Control of Brown Dog Tick; Control of Horse Ticks and Cattle Ticks; The Spinose Ear Tick.

Hitler Stooge

Herr Quisling leads a jolly life.
His coat is steel to stop a knife,
His meals upon the dog are tried
For arsenic and cyanide,
And when he rests his weary head
The good Gestapo guards his bed.

—*N. Y. Times.*

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(Classified)

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